Sri Lanka
Indonesia

Population Studies in Sri Lanka and Indonesia Based on the 1987 Sri Lanka Demographic and Health Survey and the 1987 National Indonesia Contraceptive Prevalence Survey

The Population Council

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PREFACE

The Demographic and Health Surveys (DHS) Program was initiated in September 1984 and designed as a follow-on to the World Fertility Survey (WFS) and Contraceptive Prevalence Surveys (CPS). The objectives of the program include the expansion of the international population and health data base in Africa, Asia, and Latin America to assist in policy formulation and implementation and the development of skills and resources in survey design and analysis among those working in the program.

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Information on the DHS Program can be obtained by writing to: DHS Program, IRD/Macro, 8850 Stanford Boulevard, Suite 4000, Columbia, Maryland 21045 USA (Telephone: 301-290-2800; Telex 87775; Fax: 301-290-2999). For copies of the studies published in the DHS Further Analysis series, which are listed on the last page, write to the DHS Program, The Population Council, One Dag Hammarskjold Plaza, New York, New York 10017 USA.

Traditional Contraceptive Use in Sri Lanka
A Cross Survey Analysis

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SUMMARY

The primary sources of information on patterns and trends of contraceptive use in Sri Lanka have been three surveys - World Fertility Survey (1975), Contraceptive Prevalence Survey (1982), and Demographic and Health survey (1987) - each conducted as part of a global round of surveys. According to these surveys, contraceptive prevalence in Sri Lanka has increased in leaps and bounds from 32 percent in 1975 to 55 percent in 1982 and to 62 percent in 1987. Two characteristic features of contraceptive use have been the prominent share of traditional methods - over 40 percent at each survey - and their very large contribution to the increase in prevalence, especially in the 1975-82 period - from 13.2 percent to 24.5 percent. This paper identifies the characteristics of women for whom a high prevalence of traditional methods was reported at each survey and makes an assessment of the validity of the prevalence of traditional methods measured by the above surveys.

At all three surveys, traditional users have shared certain common characteristics. The most distinguishing characteristics found at all three surveys are family size and education. Irrespective of any other characteristic, the fewer the number of living children or the higher the level of education, the higher was the use of traditional methods: among secondary or higher educated women who had only one to two living children, nearly 60 percent of those who used any contraceptive used a traditional method. The most conspicuous low use group was the estate women, particularly the traditional workers.

On the other hand, there are certain subgroups for whom the levels of traditional use measured at the three surveys differ widely. The most pervasive difference between surveys is the exceptionally high levels measured by the CPS (1982) relative to the other two surveys for particular subgroups. These are predominantly the youngest women below 25 years irrespective of any other characteristic, although the relative difference is more for women with only one to two children and with lower levels of education as primary or no schooling. In general, the CPS has recorded considerably higher levels of traditional use for women who have had no schooling, lived in estates, or did not work. Between the WFS (1975) and the DHS (1987), for most subgroups the latter recorded lower prevalence of traditional methods. The only groups for which DHS records equal or higher values are for the highest educated women, women who have had the largest family size of five or more living children or lived in estates.

Among specific traditional methods, the method most widely used has been the safe period. The safe period was more frequently used by younger women, women with smaller family sizes and better educated women. Characteristics of users of withdrawal were similar, but users of other traditional methods had characteristics at the opposite end of the spectrum. They were the elderly, the higher parity, the least educated women, and those living in estates.

The pattern of differences between the surveys in the use of specific traditional methods is remarkable. The most used method, safe period, was equally prevalent at both CPS and DHS, but it was much lower in WFS. It was withdrawal and particularly other traditional methods for which CPS measured much higher levels than both the other surveys. The WFS recorded the lowest use of withdrawal while DHS recorded the lowest, hardly any, use of other traditional methods. While the differences were predominant at small family sizes and youngest ages, roughly the same pattern is found for almost all subgroups implying that the surveys captured the methods differently across all groups.

Thus, the higher use of traditional methods as reported by the CPS was common for all 3 methods and for all subgroups with varying magnitudes. The differences in patterns of use are remarkably persistent, and impressively systematic, making it very difficult to dismiss them as random or chance variations.

Between the surveys, very particularly between WFS and the other two surveys, there are very sizeable differences in the prevalence of traditional methods among certain segments of the population. The question then is whether CPS overestimated the prevalence of traditional methods among these women or could it be that WFS underestimated it.

Evaluation of the consistency between the observed levels of contraceptive prevalence and fertility suggests that the CPS measure of prevalence of 55 percent is commensurate with the TFR of 3.7 that prevailed. A close agreement is also found at DHS between the prevalence rate of 62 percent and the TFR of 2.8. But the contraceptive prevalence of 35 percent is far too low for a TFR of the order of 3.5 measured at WFS, unless the fertility inhibiting effects of the other proximate determinants of fertility, mainly breast feeding and abortion, were much higher than those that prevailed at the other surveys conducted just a few years later, which is most unlikely. In all probability traditional methods - all of them, but the less used ones to a relatively greater extent - were underestimated by the WFS. Comparison of prevalence rates with CPS suggests that such underestimation was particularly high for the less educated in the very young age group, which was also the smallest family size group.

INTRODUCTION

Primarily as a result of three large scale surveys, namely the World Fertility Survey (WFS) of 1975, the Contraceptive Prevalence Survey (CPS) of 1982, and the Demographic and Health Survey (DHS) of 1987, much has been learnt about the contraceptive behavior of Sri Lankan women. The contraceptive behavior in the last decade is characterized by two outstanding features. One is the remarkably rapid increase in prevalence from a relatively low level of 32 percent in 1975 to 62 percent in 1987 which makes Sri Lanka's current level of contraceptive prevalence one of the highest in Asia. The second characteristic feature is the predominant role played by traditional methods, particularly the safe period. In 1975, the few traditional methods contributed more than 40 percent of all contraceptive use, surpassing the contribution of all modern temporary methods taken together, and since then they have shown an overwhelmingly rapid increase, particularly in the period 1975-82. During this period the prevalence of all modern methods increased by 58 percent from 20 percent to 32 percent while the traditional methods showed a much larger increase of 83 percent from a level 14 percent to 26 percent. In the subsequent years, the prevalence of modern methods rose to 41 percent while that of traditional methods lowered marginally to 21 percent (Sri Lanka Department of Census and Statistics, 1988).

This dramatic escalation of contraceptive prevalence and the widespread practice of traditional methods in Sri Lanka have attracted considerable attention of both demographers and family planning program managers. An issue of major concern has been the magnitude of the contribution of traditional methods to the impressive increase in total prevalence between 1975 and 1982. The accuracy of measurement of prevalence, especially the prevalence of traditional methods, has been questioned in the light of another survey, the Family Health Impact Survey conducted about the same time as the CPS which indicated much lower levels of prevalence of traditional methods while being in agreement in the measurement of modern methods (Family Health Bureau, 1984). These concerns in fact led to a resurvey of a subsample of CPS to further investigate the use and measurement of traditional contraceptive methods (Department of Census and Statistics, 1987). The findings reaffirmed the wide acceptance and the high prevalence of traditional methods and suggested that perhaps WFS, the first national survey to measure contraceptive behavior, has underestimated the practice of traditional methods (Caldwell et al., 1988).

This paper seeks to examine the rise in prevalence of traditional methods during the period 1975 to 1987 as measured by WFS, CPS, and DHS. The question addressed is:

> "Have the differences in survey design and changes in population composition affected the measured trends of traditional contraceptive prevalence?"

This paper begins with a profile of traditional method users in Sri Lanka as observed by the three surveys.

A direct comparison of measures of prevalence from the three surveys is not possible because of a difference in coverage in the DHS which excluded seven districts in the northern and eastern parts of the country due to unsatisfactory field conditions. Hence these areas are excluded from the other two surveys and the analysis is confined to the 17 districts in the rest of the country. The population in these excluded areas is predominantly of the ethnic group Sri Lanka Tamils and also Moors who are concentrated in the eastern coastal area. Hence, the background variables by which differences in contraceptive use are examined do not include ethnicity and religion.

PROFILE OF TRADITIONAL USERS

In the areas of the country covered by all 3 surveys, 14, 26 and 20 percents of all currently married women were users of traditional methods of contraception at the 1975 (WFS), 1982 (CPS), and 1987 (DHS) surveys, respectively. In this section users of traditional methods are identified in terms of selected characteristics: age, living children, sector (residence), education, and work status as observed in the three surveys. We then describe which subgroups of the population used traditional methods most, and subgroups for whom the measured prevalence of traditional methods was most at variance between the three surveys.

Table 1 presents women of different background characteristics who use traditional methods as a percentage of all currently married women in each of the three surveys. Rather a clear profile of traditional users can be observed with a particular pattern of variation between surveys.

Older women more than younger ones have used traditional methods at the time of WFS in 1975; among women 25 years and older, 15 percent were using traditional methods, while among younger women only 7 percent did so (Chart 1). A similar age profile existed at the DHS in 1987, but not at the CPS in 1982 when there was almost no difference by age, with about one fourth of women in each age group using a traditional method. Women with fewer living children used traditional methods more often than those with more children in all three surveys.

The characteristic which most distinguishes a woman's use of traditional contraceptives consistently in all three surveys is education. The higher the level of education, the higher the use of traditional methods. At WFS, the use of traditional methods increased monotonically from 7 percent among women with no schooling to 25 percent among women with more than secondary education, at CPS from 18 percent to 33 percent, and at DHS from 10 percent to 31 percent (Figure 2).

Work status of a woman, unlike her age, number of living children, or education, had relatively little association with the use of traditional methods. Urban or rural residence too made only marginal differences in the level of use of traditional methods. Yet, residence on estates was associated with very low levels of traditional method use.

The absolute percentage of traditional users may not present the true magnitude of the use of traditional methods by a particular subgroup relative to other subgroups. The percentage of traditional users in a particular subgroup could be low because in that group total contraceptive use is low. Whether this in fact has been the case can be examined by comparing the proportion of traditional users among users of any method only, rather than among all currently married women.

The percentages of traditional users among contraceptive users only are given in Table 1 along with prevalence among all currently married women. This measure reinforces the pattern of use observed earlier among all currently married women with respect to some variables, and modifies the pattern somewhat with respect to others.

The age profile of traditional users as shown by the WFS is still dominated by older women, but this age profile changes at the CPS to one dominated by the youngest women. At the CPS, 61 percent of young users between 15 to 24 years used traditional methods compared to just over 40 percent at the older ages. The same pattern of higher use at the youngest ages is maintained later on at DHS, but with lower frequency of use.

Women with fewer living children are clearly the more frequent users of traditional methods. This was most pronounced in the CPS (1982) when 63 percent of users with 1 to 2 living children used a traditional method compared to 30 percent of those with 5 more children. These proportions were 55 percent and 32 in 1975 (WFS), and 52 and 20 percents respectively in 1987 (DHS).

While age and living children profiles change somewhat when compared among users, the pattern of education of traditional users remain unchanged as it was relative to all women in all three surveys. While among all currently married women who have not gone to school about one third (slightly less at DHS) used traditional methods, with increasing education this proportion increased until at the highest levels fully one half of users used traditional methods.

Work status and urban rural patterns change direction when compared among users only as opposed to all currently married women. For example at WFS, among all women, urban and not working groups had higher use levels than rural and home based workers, but among users the urban and not working groups had lower levels of use. The magnitude of the differences, however, is small.

In summary, consistently in all three surveys, women who most used traditional methods are the better educated, and those who least used them are estate residents. On the other hand, age, which had a differing pattern, changes into a stronger factor when controlled for variation in the extent of overall use; so does the number of living children. The younger the women, or the fewer the number of living children, decidedly the higher is the use of traditional methods among users. There are some outstanding differences in the profiles of contraceptive users at the three surveys. In 1982 (CPS), particular subgroups are found to have rather high traditional method use relative to the other two surveys. These subgroups are the youngest women (below 25 years), women of lowest family sizes (1-2 children), lowest education, and to a lesser extent, urban women and non working women. In 1975 (WFS), there was a conspicuously low use by the youngest age group.

The differences in use of traditional methods by subgroups of women observed above could be further examined within subgroups defined by pairs of characteristics to identify more specifically the traditional users. Tables 2 to 10 present the users of traditional methods as a percentage of all currently married women and of all users by pairs of background characteristics for the three surveys. First, subgroups within education levels - which were seen above to be widely different in the level of use - are discussed. This is followed by subgroups within work status categories and place of residence groups.

It was observed earlier that traditional use was higher at higher levels of education and at the youngest ages under 25 years. Table 2 shows that the sharp and steady increase in prevalence with increase in education is most prominent in the middle age group of 25 to 34 years. At the oldest and youngest ages, age rather than education seems to be the determining factor. Within no schooling and primary levels, use is higher at the extreme ages. Within the secondary and higher levels, there is no sharp or consistent age pattern and use is much higher at all ages compared to the lower education levels.

The exceptionally high use of traditional methods by women under 25 years in 1982 is independent of educational attainment, except among the no schooling group. The high percentage of traditional users in the youngest age group of 15-24 years at all levels of education at CPS compared with the other two surveys is clearly seen in chart 3. Although it appears from Table 2 that the high level of about 60 percent use among the youngest group recorded at CPS is at education levels primary and above, it is true that even at no schooling level it is extremely high (48 percent) when viewed in comparison to both the previous survey and the subsequent survey (25 percent at WFS and 14 percent at DHS). The relative difference is higher at the lower levels of education, no schooling and primary.

Considering education-living children subgroups, the traditional use pattern given in Table 3 shows that while among women with fewer living children traditional use increases with education up to secondary level,

among women with larger numbers of children there is no consistent pattern. What is very clear is that within each level of education whether it be no schooling or the highest level, the number of living children clearly distinguishes low and high use: one to two children group has used traditional methods decidedly more frequently than the others consistently at each survey. Thus, it is family size, rather than education that predominantly identifies traditional users.

As with the age-education subgroups, here too CPS differs from the other two surveys in that the use level is considerably higher for the lowest family size group. This is especially true within the lower education levels of no schooling and primary schooling relative to the other two surveys (65 percent at CPS compared to 40 percent at WFS and 24 percent at DHS for the no schooling group). This high use level by low family size and the exceptionally high values at CPS within levels of education are depicted in Table 3 and figure 4.

Considering education-residence subgroups (Table 4), it must be noted that the education level of the estate women has been almost exclusively either no schooling or some primary, although there were a few with secondary education at the time of DHS. For these women on the estates, there was hardly any difference in the level of traditional method use by education. Among both urban and rural women, the better educated women were clearly more frequent users of traditional methods. Within each education level the urban-rural differences were marginal and showed no consistent pattern between levels of education or surveys.

Considering education-work status subgroups, the figures given in Table 5 show that work status which was observed earlier to have no distinct use pattern tends to assume one within levels of education as recorded at WFS and DHS; within lower levels of education, non-working women use more than working women, while within secondary and higher levels, it is working women who use more. Among those with no schooling, the pattern is less clear. In the WFS women who were not working and those who worked away from home had about the same levels of use of traditional methods. The DHS showed that women with no education who worked at home had a slightly higher use of traditional methods than did women who were not working. The combination of lowest education and working - probably at manual jobs - could be identified as the lowest living standard as opposed to the upper living standard of those who are working with secondary or higher education. Using this classification, traditional use is higher among those having an upper living standard than among those with a lower living standard. Here too the CPS is exceptional in that it has higher use levels among non-working women, particularly at the no schooling level. The DHS on the other hand has recorded much lower levels than the two previous surveys for working women at the highest level of education.

The significant difference between the surveys is that CPS has recorded a much larger proportion of traditional users for the not working-no schooling group. DHS has recorded much lower use levels for all education and sector combinations except those with the highest education. These differences in use between education-sector subgroups between surveys are illustrated in chart 5.

The levels of traditional use for subgroups by age, living children and sector within work status groups are given in Tables 6, 7, 8. Irrespective of work status the younger women and those with one or two children were the more frequent users of traditional methods. Place of residence has a close relation to work status in that estate women almost exclusively work away from home. Among women who work away from home estate women were the lowest users in all 3 surveys, and urban women were the most users except at WFS. For women who were not working or were engaged in work at home, place of residence had no particular bearing on traditional method use.

Finally, considering the age group and living children subgroups within place of residence groups, it is seen from Tables 9 and 10 that the pattern of use by age and living children observed earlier holds irrespective of sector. One significant difference is the exceptionally high use level for estate women with large families recorded at WFS (50 percent of users compared to 20 percent at each of the other two surveys). It must be remembered that estimates for this group are based on a small number of cases, below 20 at each survey.

From the above analysis, it is seen that certain subgroups of women were clearly more frequent users of traditional methods than others. Women with smaller numbers of children and higher levels of education were the most frequent users. Family size and education were by and large the determining factors. It was also seen that CPS had much higher levels relative to the other two surveys for some subgroups. These groups are

youngest women (under 25 years) particularly of lower levels of education, women with 1 to 2 children and lower levels of education, non-working women especially low levels of education, non-working urban women - among all these groups nearly 50 percent or more of those who were using contraception, used a traditional method.

Let us now examine the specific traditional methods more frequently reported at CPS and the other two surveys. Table 11 gives the percentage of currently married women and users using traditional methods. Traditional methods reported as practiced in the three surveys are safe period, withdrawal, and various "other methods," including abstinence. The method most frequently used is safe period. Of all currently married women nearly 15 percent have used safe period at CPS and also at DHS but a lower proportion of 9 percent at WFS. Withdrawal has been used by 5 percent at CPS, by lower proportions of the order of 2 to 3 percent at both the other surveys. Other traditional methods too have been used by relatively a high proportion of 7 percent at CPS compared to 4 at WFS and 3 at DHS. Thus, the prevalence of each method is higher at CPS than at WFS and DHS except for safe period, the prevalence of which was nearly equal at DHS. The prevalence of individual traditional methods are shown in Chart 6.

Thus, the large increase in the use of traditional methods between WFS and CPS has resulted from a dramatic increase in the reported use of the safe period from 9 to 14 percent, withdrawal from less than 2 percent to 5 percent, and other methods from about 4 percent to 7 percent. The decline from CPS to DHS is limited to withdrawal (to 5.6 percent) and other methods (to 3 percent).

The method mix remains fairly similar in all 3 surveys, in that fully one-fourth of users were using the safe period at each survey. A little over ten percent were using other methods at both WFS and CPS, and about 9 percent used withdrawal at CPS and a smaller 5 percent at WFS. The noteworthy difference in the method mix is the smaller contribution of withdrawal (>6 percent) and other methods (3 percent) at DHS.

The differences among subgroups and surveys in the use of individual traditional methods are given in Tables 12 to 16. Consider first the most widely used method, the safe period. No consistent age pattern exists in the use of safe period. It has been used roughly equally by all age groups at CPS, less among those below 25 than among other age groups both in the WFS and DHS, and about the same for age groups 25-34, and 35 and above. For all age groups, CPS and DHS show similar levels - DHS levels are even higher than those of CPS for the two older age groups - but WFS levels are considerably lower at all ages, particularly at the youngest ages.

In general, use of safe period is highest among women with the smallest number of living children and decreases considerably with increasing family size. At WFS, this negative association is masked because the recorded level for the youngest group is very low (relative to the other two surveys). Among different categories of living children, as it is with age groups, use of safe period is very similar at CPS and DHS, but is much lower at WFS, except for the modal family size of 3 to 4 children. For the family size of one to two children, WFS recorded only 12 percent, while the other two surveys recorded over 20 percent use.

Between places of residence, the safe period is clearly a method shared by urban and rural women, but rarely used by estate women. For all three sectors, WFS records much lower levels than the other two surveys, and for urban women the DHS records a slightly higher use than does the CPS.

The safe period is overwhelmingly the method adopted by better educated women at all 3 surveys (Table 15 and Figure 7). About 20 percent of women of higher education adopt safe period compared to less than 5 percent of no schooling women.

At each level of education, CPS records considerably higher use than did the WFS and a little more than the DHS. The relative differences are larger at lower levels of education. One exception to this pattern is that DHS has recorded a higher value than CPS for the higher levels of education.

Non-working women and home based workers used the safe period more than those working away from home in 1975 and 1987. In 1982, however, there was hardly any difference in the not working and working away from home groups, whereas those working at home had much larger percentages of safe period users. Further,

not only was the level of use higher at CPS than at WFS, it was even higher at DHS than at the CPS for both categories of working women (and was almost equal for the non-working group).

Thus, women of younger ages, women with small family sizes, and better educated women, use the safe period far more than others. Estate women use it hardly at all. The percentage of women using safe period is very similar at CPS and DHS, but is much lower at WFS for family size of one to two children, and for all ages, particularly the youngest age group, for all levels of education but relatively more at lower levels, and for all work status groups and all sectors.

Withdrawal shows the same pattern of use among subgroups as the safe period although its level of use is much lower. At all three surveys use of withdrawal is higher at younger ages, smaller family sizes, and higher levels of education, not working groups and rural women. Withdrawal, like safe period, has hardly been reported in the estate sector. The difference between the surveys, unlike the case with safe period, is not only that the level of use is extremely low at WFS relative to CPS, but it is also somewhat lower at DHS. The differences are most pronounced for smaller family sizes and lower levels of education - below secondary. It must also be noted that DHS has recorded higher use levels of withdrawal than WFS, for all subgroups considered.

Other traditional methods show patterns of use among subgroups quite opposite to those shown for safe period and withdrawal. Groups that use "other traditional" methods more are those that use safe period and withdrawal less. The use of other traditional methods is higher among women having larger family sizes, lower levels of education, living on estates rather than in urban and rural places. By far the most used method in the estate sector is "other methods," which accounts for almost all of the traditional methods used by estate women. Among surveys, as with the other two methods, CPS records the most, but DHS and not WFS records the lowest levels. The relative excess in the percentage of women using other traditional methods among all users at the CPS is quite high at all levels of education and is not confined to lower levels as was the case with safe period and withdrawal. Yet, for certain groups the relative difference is higher than for the others. These are predominantly the youngest women, women with one to two children, and the estate women.

Thus, much of the difference in the level of traditional use between CPS and its predecessor WFS can be attributed to the following: higher level of safe period among women 1 to 2 children, higher level of withdrawal among 1-2 and 3-4 family sizes, and a larger reported use of other traditional methods in the 1 to 2 child women. The higher levels of use at CPS and also DHS relative to WFS are of roughly equal magnitude at all levels of education.

From the foregoing observations on the use of traditional methods in the three surveys, one sees that there is an impressively consistent pattern of use of traditional methods by subgroups of women and also that there is a persistent relationship between the patterns of use between the three surveys. In essence, patterns of use in all three surveys are in agreement; the WFS recorded systematically lower levels of use relative to CPS while DHS recorded values very similar to CPS for safe period but much lower values for withdrawal and other traditional methods for which very low levels have been recorded at DHS.

It was observed that traditional methods are used more by young, low parity and better educated women than the older, higher parity, and less educated women. They were used least by estate women. The changes in the population composition in terms of age, parity, education, and sector could then result in higher values for prevalence without a real increase in use levels. Whether such compositional changes have affected the prevalence rates could be assessed by computing standardized prevalence rates.

THE EFFECT OF CHANGES IN POPULATION COMPOSITION ON PREVALENCE OF TRADITIONAL METHODS

The prevalence rates of traditional methods at CPS and DHS when standardized on the sample composition of WFS by age, number of living children, place of residence, education and work status are given in Table 17.

Adjusting for the changes in the composition over time for no single variable alters appreciably the overall prevalence of traditional methods from the observed value either at CPS or DHS. The highest impact which is of the order of 2 percentage points is when educational composition and family size are controlled. Had it not been for a shift in the educational composition towards higher levels, the prevalence of traditional methods at CPS would have been 24.6 percent rather than the observed 26.1 percent, and at DHS, 17.5 percent rather than the observed 20.3 percent. Controlling for the changes in family size, which had changed toward lower averages, lowers the observed prevalence by about one and a half percentage points at DHS and two percentage points at CPS. Standardization of traditional method prevalence among subgroups defined by one variable controlling for other variables (results not shown) show that the level of use within each subgroup remain unchanged, any change usually being less than 1.5 percentage points. Not only does standardization leave the overall prevalence unchanged, it also makes no change in the prevalence of individual methods (results not shown).

Thus, the observed large increase in the prevalence of traditional methods from 14 percent at WFS to 26 percent at CPS and the change to 20 percent at DHS cannot be attributed to a compositional change in the population except for a marginal extent of an order of 2 percentage points.

The question then is " Did WFS underestimate the prevalence of traditional methods among particular subgroups or did CPS, and to smaller extent DHS, overestimate their prevalence." One approach to seeking a solution is to examine the consistency of the levels of contraceptive prevalence with the levels of fertility observed at each survey.

AN EVALUATION OF THE CONSISTENCY OF CONTRACEPTIVE PREVALENCE AND FERTILITY

During the period 1975 to 1987, the recorded trend in contraceptive prevalence has been one of dramatic increase as seen in Table 18. The increase from 1975 to 1982 has been from 32 percent to 55 percent and then to 62 percent by 1987 for the country, excluding the few districts in the north and the east. But fertility has not shown a parallel impressive decline. The TFR at WFS was 3.4, and was even higher, 3.7, at CPS. It was 2.8 at DHS for the area of the country covered by the survey. Had north and east been included, one could safely argue that the TFR would have been a point or two higher, for it is well established that the excluded areas, particularly the east, have had slightly higher than average fertility levels over the years (De Silva, 1986 p 7). The contradiction in the trends in contraceptive prevalence and total fertility rate can be seen in Figure 8.

It has been observed that strong empirical relationships exist between TFR and contraceptive prevalence. One such relationship has been established by Bongaarts and Kirmeyer (1980) based on the data on contraceptive prevalence and fertility levels in 22 developing countries including Sri Lanka. The fertility levels estimated from this empirical relationship are compared with the observed rates in Table 19. It can be seen that at CPS the TFR observed is almost identical to the value estimated from the contraceptive prevalence levels. The age specific fertility levels also are in very close agreement, the small differences being negative. At DHS, too, the observed fertility levels closely correspond to those dictated by the prevalence levels while the observed values tend to be somewhat higher at younger ages. In contrast, at WFS the observed fertility levels are very much higher than those expected from the contraceptive levels. According to contraceptive prevalence, the TFR should have been 4.5, fully one child more than the observed 3.4. The age specific fertility rates were higher than expected by about 40 percent for the younger ages of 20-24 and 25-29 years, the ages of peak fertility.

More recently Mauldin and Segal (1988) have demonstrated the existence of a strong linear relationship between TFR and contraceptive prevalence on the basis of data mainly from WFS, CPS, and DHS, covering the period mid 1960s to mid 1980s for 86 countries, the regression estimate of which is

$$TFR = 7.38 - 0.072 * \text{CONTRACEPTIVE PREVALENCE}$$
$$R^2 = 0.87.$$

The contraceptive prevalence consistent with the TFRs calculated from the WFS, CPS, and DHS, as implied by this relationship and the observed values given in Table 20 show that there is very close correspondence between

the observed and the estimated prevalence at CPS and DHS. In fact, as observed earlier for CPS, the observed prevalence is a shade higher than is necessary inasmuch as the observed TFR was a little higher in the earlier comparison. But at WFS, the observed prevalence is too low by over 20 percentage points for a TFR of 3.4 children.

The observed inconsistency between fertility and contraceptive prevalence at WFS could result from either an underestimation of fertility rates or an underestimation of contraceptive prevalence or inaccurate estimation of both fertility and contraceptive prevalence. That fertility levels have been underestimated at WFS, sufficient to lower the TFR by about one child, could reasonably be ruled out. Evaluation of birth history data and fertility levels at WFS given in the first country report and in a subsequent detailed analysis (Alam and Cleland, 1980) assures that fertility levels at least at national level were reasonably accurate. Following a critical evaluation of birth history data, Alam and Cleland conclude that only two defects could be detected - one concerning the probable omission of births before 1960 that died subsequently, which was of a very small magnitude, and the other concerning the possible backward displacement in time of dates of first marriage and of early births or understatement of current age leading to a downward bias on age at marriage. The exact magnitude has not been assessed due to lack of alternative data, but it has been asserted that it is of a negligible order. These two defects in any event cannot affect the fertility rates for the year preceding the survey which are considered here while it is possible age misstatement could distort the age specific rates.

The TFR of 3.7 recorded at CPS is slightly higher than the independent estimate of 3.4 from vital registration for the period 1980-82. Perhaps there has been a marginal overestimation of fertility at CPS which was estimated from the response to the single direct question on the date of birth of the last live birth unlike in the case of the other surveys that probed carefully on all births through detailed birth histories. The important point, however, is that the TFR has not declined between 1975 and 1982. There exist other evidence which support this contention. One piece of evidence is from fertility rates estimated from DHS for periods prior to the survey which indicate clearly that there had been a slight crest in fertility movement from the mid-1970s to the turn of the 80s. The age specific fertility rates for the period 5 to 9 years prior to the survey, i.e., 1980-1983 for all age groups below 30 years are higher than for the preceding and the following 5-year periods (Department of Census and Statistics, 1988 p40). Fertility was higher in 1982, at the time of the CPS, than at the times of WFS and DHS, 1975 and 1987.

Further supporting evidence of a low hump in fertility trends in this period are found in the birth rates in this period shown in Figure 9. The crude birth rate has risen by a couple of points since 1975 to a peak of about 29 births per 1000 by 1980, but has thereafter resumed its downward trend dipping to near 22 births per 1000 by 1987, supporting the decline in TFR implied by the measured value at DHS.

Finally, trends in TFR based on independent estimates from vital statistics and from indirect estimates based on census data for various periods between 1962 and 1981 given in Table 21 lend strong credence to a TFR of the order of 3.5 in 1974 and a stagnation at this value for a little over a quinquennium. It could be argued that TFR at WFS could have been a decimal point or 2 higher on the basis of such magnitudes observed from independent sources given below and on the well-acknowledged fact that the WFS recorded unexplainably low fertility for a small segment of the population, the estate women. (See WFS, Sri Lanka First Report p79; several secondary analyses of WFS data have excluded women for this reason. e.g., Meegama [1981], Little and Perera [1983]).

Thus, all available evidence suggests that the level of TFR of 3.4 at WFS, the slightly higher value at CPS, and the lower value at DHS represent the approximate order of magnitude of fertility.

The inconsistency between fertility and contraceptive prevalence, observed particularly at WFS, should then stem largely from underestimation of contraceptive prevalence. External evidence for evaluating the level of contraceptive prevalence measured at WFS is available from another survey, namely the Family Health Baseline Survey, conducted by the Family Health Bureau of the Sri Lanka Ministry of Health. Conducted only a few months before the WFS, this survey had been in many ways similar to WFS and surveyed 4337 currently married women, of whom 3440 were non-pregnant and exposed. Table 22 presents results from the FGBS and the WFS surveys.

It can be seen that the two surveys have given practically the same results for prevalence of all modern methods, but for traditional methods safe period and withdrawal, FHBS has reported considerably higher percentages than the WFS. The differences in these two methods account for almost all of the difference between these two surveys. Contraceptive prevalence, which is the percentage of all currently married women (irrespective of exposure status) given by FHBS, is 43 percent which is much higher than the 35 percent measured at WFS.

The high percentage of withdrawal reported here could be associated with the fact that the interviewers of this survey have been specifically alerted to carefully follow the instructions for probing on withdrawal, for this was suspected to be widely practiced. Even without any such specific probes, safe period use too has been high. Therefore, this survey conducted just a few months prior to WFS, identified higher prevalence of traditional methods, suggesting that WFS has probably underestimated traditional methods. Such underreporting of traditional methods at WFS has been suspected in earlier studies (see Gajanayake, 1982; United Nations, 1985; Caldwell et al. 1987).

It is also possible to compare the prevalence measured at CPS with other sources. One source is the Family Health Impact Survey (FHIS) which covers almost the same period as CPS which was conducted by the Family Health Bureau of the Ministry of Health as a totally independent survey. The second source is the Sri Lanka Contraceptive Survey (SLCS) which was an in-depth follow-up of the CPS respondents living in districts other than north and east, three years later (1985), carried out by the Department of Census and Statistics with the primary objective of assessing as completely as possible the use of traditional methods. The percentages of currently married women using specific contraceptives from CPS are compared with those from FHIS in Table 23. The table also gives the percentage of users observed at SLCS and those of CPS adjusted for age, marriage duration, and area covered by the follow up survey. Results from the Family Health Impact Survey agree impressively with the CPS in the prevalence of all modern methods, differing by less than one percentage point on each method. But the two surveys differ substantially in the prevalence of traditional methods. These differences are such that the CPS estimated contraceptive prevalence to be 55 percent while the FHIS estimated it to be 43 percent, 12 percentage points lower.

The follow-up survey, which adopted a very detailed questionnaire with series of method specific questions and intensive probing, designed after an anthropological study in a fashion very different from WFS or CPS, estimated that 26 percent of the sample of CPS respondents (under 50 years) were using traditional methods of contraception, at a time when they were three years older which adds much reassurance to the estimate of 24.5 percent at the time of CPS. Similar levels (21 percent) of traditional use observed at DHS reinforces the order of magnitude of the prevalence of traditional methods during this period.

The available evidence on levels of fertility and contraceptive use, then, precludes the possibility that fertility levels were underestimated to any appreciable extent in any of the three surveys. The survey of particular focus, WFS, may have underestimated fertility by a shade but not to the extent of one child or so which is the extent of discrepancy examined. Some evidence was found for the existence of higher traditional use than that measured at WFS. The prevalence of traditional methods measured at CPS could not be too high given its conformity with a follow-up survey and similar levels observed at DHS. Further, given that an order of magnitude of total contraceptive prevalence as measured at CPS and DHS are required for the existence of TFR at observed levels, it can be asserted that the CPS has not overestimated the prevalence of contraceptive methods, nor has DHS; in fact, DHS may have slightly underestimated contraceptive use. However, it could be argued that at these surveys, an overestimate of traditional methods was counteracted by an underestimate of modern methods. This view is easily dispelled by the remarkable agreement in the measurement of modern methods between surveys. Prevalence of modern methods agreed within one percentage point or so between the Base Line Survey and WFS taken a few months apart, and between CPS and FHIS covering approximately the same period. Besides, trends in percentages using these methods are mostly monotonic, small fluctuations being for little used methods. Hence, if modern methods were underestimated, then they have been underestimated systematically for all methods at all of the surveys, which possibility could safely be precluded.

It can therefore be concluded that all evidence assures that traditional contraceptive prevalence was not overestimated at CPS and DHS. CPS has captured most of the true prevalence of traditional methods while DHS has done so to a possibly smaller extent. As for WFS, the contraceptive prevalence of 34 percent - too low

for the TFR of 3.4 (or a little higher) that prevailed at the time - combined with higher estimates from another survey and considerably lower prevalence levels observed for younger ages implies that measured prevalence was an underestimate. The extent of underestimation could be conservatively estimated to be at least 15 to 20 percentage points in keeping with the required prevalence of about 55 percent for a TFR of about 3.5.

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Table 1: Women Using Traditional Methods As a Percentage of All Currently Married Women and of All Users by Background Variables

Background Variable	WFS		CPS		DHS	
	Women	Users	Women	Users	Women	Users
Total	14.1	41.2	26.1	44.9	20.3	33.3
Age						
15-24	7.4	35.4	27.1	61.2	15.2	39.6
25-34	15.3	38.7	26.3	43.5	20.2	32.7
35-49	15.5	45.2	25.2	41.2	22.1	32.3
Living children						
1-2	16.2	55.1	34.5	63.0	28.1	51.7
3-4	17.9	40.6	26.1	36.0	18.4	24.5
5+	12.3	31.5	19.3	29.8	14.9	20.4
Place of residence						
Urban	17.0	40.0	27.1	45.1	23.2	36.1
Rural	14.9	43.2	27.1	46.4	20.7	33.9
Estate	4.4	24.2	14.4	29.0	7.5	14.7
Education						
No Schooling	6.7	31.7	18.0	38.1	10.0	18.5
Primary	11.6	36.5	21.7	38.7	14.3	23.0
Secondary	18.3	45.0	30.1	48.2	21.4	34.5
Higher	24.7	50.8	32.8	53.0	30.5	50.4
Work status						
Not Working	15.0	40.6	27.7	47.7	20.0	32.9
Works at home	14.5	43.9	24.6	41.3	26.2	35.9
Works away	12.2	41.7	22.2	38.7	21.2	34.9

Table 2: Percentage of Women Using Traditional Methods Among all Currently Married Women and Among All Users by Education and Age - WFS, CPS, DHS

Age Group	No Schooling		Primary		Secondary		Higher	
	All Women	Users	All Women	Users	All Women	Users	All Women	Users
WFS								
<25	3.7*	24.8	5.4	35.1	9.4	38.4	9.0*	34.6
25-34	3.2*	14.2	9.8	27.1	21.8	46.6	27.6	54.1
35-49	9.0	41.9	15.0	45.0	19.4	44.9	26.6	49.7
All ages	6.8	32.1	11.6	36.5	18.2	44.8	24.8	50.9
CPS								
<25	14.3	47.7	27.7	66.3	28.8	60.0	31.5	60.6
25-34	17.6	32.5	20.9	35.4	28.7	44.7	34.2	59.4
35-49	19.2	40.1	19.8	33.2	32.8	48.0	32.0	45.8
All ages	18.0	38.1	21.7	38.7	30.1	48.3	32.9	53.2
DHS								
<25	4.0*	14.3	15.0	35.7	16.8	44.6	19.0	45.7
25-34	7.7	12.9	10.5	17.0	21.4	33.9	32.3	53.5
35-49	13.5	23.0	17.0	24.7	23.2	32.7	32.3	48.6
All ages	10.2	18.9	14.3	23.0	21.4	34.5	30.5	50.5

Note: figures marked with * are based on less than 20 cases.

Table 3: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Education and Number of Living Children - WFS, CPS, DHS

No. of living children	No schooling		Primary		Secondary		Higher	
	Women	Users	Women	Users	Women	Users	Women	Users
WFS								
1-2	3.6*	40.4	8.9	46.8	19.8	58.1	30.5	58.9
3-4	5.7*	25.9	15.1	38.1	24.8	45.3	30.2	44.0
5+	9.1*	33.0	13.2	32.0	13.8	27.5	20.7*	36.1
CPS								
1-2	19.5	64.8	27.9	61.1	38.5	63.0	41.4	64.6
3-4	19.5	34.2	24.8	36.1	27.9	35.7	29.6	37.8
5+	18.1	32.1	16.5	24.7	24.3	36.2	27.5*	35.5
DHS								
1-2	8.4*	23.6	18.9	39.4	28.0	51.2	38.1	61.6
3-4	8.9*	12.5	13.7	19.1	20.7	26.6	26.1	33.7
5+	13.4	22.0	13.0	17.5	16.0	20.3	27.3	36.8

Note: figures marked with * are based on less than 20 cases.

Table 4: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Education and Sector - WFS, CPS, DHS

	No Schooling		Primary		Secondary		Higher	
	Women	Users	Women	Users	Women	Users	Women	Users
WFS								
Urban	7.1*	31.4	15.0	40.4	17.6	37.9	22.7	44.0
Rural	7.6	33.2	12.0	36.6	19.2	48.9	25.8	54.5
Estate	4.2*	26.6	4.8	26.8	--	--	6.2*	12.4
CPS								
Urban	22.2*	47.9	21.8	38.4	28.8	44.3	30.7	52.3
Rural	18.5	37.2	22.8	40.5	31.0	50.7	35.0	54.5
Estate	14.3*	35.8	14.6	37.4	17.2	25.0	--	--
DHS								
Urban	11.6*	18.5	14.3	20.9	21.0	33.1	33.7	53.4
Rural	10.8	20.1	15.2	24.2	21.7	35.2	30.0	50.0
Estate	7.5*	14.7	6.3*	12.7	8.1*	14.3	11.8*	28.6

Note: Figures marked with * are based on less than 20 cases.
-- No users in these groups

Table 5: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Education and Work Status - WFS, CPS, DHS

Work Status	No Schooling		Primary		Secondary		Higher	
	Women	Users	Women	Users	Women	Users	Women	Users
WFS								
Not working	7.6	33.3	13.2	38.8	17.6	42.2	20.8	44.0
Works at home	6.0*	27.4	11.1	33.9	21.6	46.4	34.9	68.7
Works away	6.2	32.6	8.5	32.3	17.8	55.6	28.8	57.4
CPS								
Not Working	20.5	44.2	23.0	41.6	30.5	49.6	33.2	54.6
Works at home	16.2*	30.7	19.6	33.3	32.1	48.9	34.4*	64.7
Works away	15.7	34.1	19.7	34.8	24.2	37.6	32.2	49.2
DHS								
Not working	10.6	20.7	15.0	24.0	21.1	34.3	27.9	46.4
Works at home	20.0*	23.1	13.9*	21.7	38.2*	46.4	31.8*	53.8
Works away	8.3	14.7	10.7	17.8	21.7	32.6	40.4	65.2

Note: figures marked with * are based on less than 20 cases.

Table 6: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Work Status and Age - WFS, CPS, DHS

	Did Not Work		At Home		Away Home	
	Women	Users	Women	Users	Women	Users
WFS						
<25	7.7	32.6	11.1*	50.0	2.6*	26.3
25-34	17.3	40.0	15.3	38.3	11.0	35.5
35-49	16.0	43.5	14.7	47.6	15.1	47.5
CPS						
<25	27.9	60.3	36.5	79.3	17.3	51.5
25-34	27.9	46.2	22.1	33.0	23.1	40.5
35-49	27.3	44.3	22.4	38.6	23.0	36.1
DHS						
<25	15.4	39.9	66.7*	100.0	11.6*	31.4
25-34	20.2	32.8	22.5	31.0	19.8	32.4
25-34	20.2	32.8	22.5	31.0	19.8	32.4
35-49	21.5	31.6	26.2	34.8	24.9	37.5

Note: Figures marked with * are based on less than 20 cases.

Table 7: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Work Status and Number of Living Children - WFS, CPS, DHS

	Did Not Work		At Home		Away Home	
	Women	Users	Women	Users	Women	Users
WFS						
1-2	16.9	52.5	18.8	64.8	13.9	57.9
3-4	19.6	41.3	19.1	45.9	13.5	35.2
5+	12.6	29.7	13.1	31.2	12.9	36.3
CPS						
1-2	35.4	63.7	34.2	64.0	32.0	60.6
3-4	28.0	39.1	26.5	34.8	20.1	27.6
5+	20.2	31.3	18.3	28.5	17.9	27.5
DHS						
1-2	27.2	49.2	37.1*	52.0	31.6	57.4
3-4	18.6	24.6	30.8*	38.7	15.9	21.5
5+	15.1	21.0	11.5*	13.6	15.4	19.2

Note: Figures marked with * are based on less than 20 cases.

Table 8: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Work Status and Sector - WFS, CPS, DHS

	Did Not Work		At Home		Away Home	
	Women	Users	Women	Users	Women	Users
WFS						
Urban	16.1	39.9	22.7*	40.0	19.9	40.5
Rural	14.8	41.7	14.1	44.2	16.1	46.5
Estate	6.8*	13.6	0.0*	0.0	4.2	27.1
CPS						
Urban	27.4	44.6	16.1*	35.7	29.3	51.5
Rural	28.0	49.2	25.5	41.9	24.9	40.5
Estate	16.7*	38.5	14.3*	25.0	14.1	28.1
DHS						
Urban	20.8	32.8	27.8*	41.7	43.3	61.9
Rural	19.8	33.0	26.4	36.5	26.6	40.7
Estate	15.2*	31.8	0.0*	0.0	6.7	13.2

Note: figures marked with * are based on less than 20 cases.

Table 9: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Sector and Age - WFS, CPS, DHS

	Urban		Rural		Estate	
WFS						
<25	9.1*	39.2	7.9	35.1	-	-
25-34	17.5	37.3	16.5	40.3	4.6*	23.5
35+	19.4	42.8	15.9	47.5	6.1*	27.5
CPS						
<25	29.5	63.9	28.3	62.5	14.9*	43.4
25-34	25.3	40.6	28.4	47.1	11.0*	20.3
35+	28.3	44.8	25.2	40.7	18.3*	33.3
DHS						
<25	15.5	32.0	16.1	41.8	3.1*	14.3
25-34	21.4	34.6	21.4	34.2	2.8*	5.4
35+	26.3	37.8	21.7	32.1	13.5*	21.8

Note: Figures marked with * are based on cell sizes less than 20 cases.

Table 10: Percentage of Women Using Traditional Methods Among All Currently Married Women and All Users by Sector and Living Children - WFS, CPS, DHS

	Urban		Rural		Estate	
	Women	Users	Women	Users	Women	Users
WFS						
1-2	18.1	49.6	18.0	58.1	3.7*	38.9
3-4	23.6	42.9	18.6	42.8	3.3*	11.6
5+	13.6	26.6	12.5	32.7	8.9*	50.0
CPS						
1-2	34.6	58.2	36.9	66.7	17.6	47.7
3-4	27.5	35.7	26.9	38.0	14.6*	20.0
5+	23.0	33.0	18.8	29.7	15.6*	21.9
DHS						
1-2	30.4	51.6	29.4	53.3	4.7*	15.4
3-4	19.7	25.3	19.1	25.4	8.1*	27.0
5+	19.7	24.5	14.1	19.7	16.1*	21.3

Note: Figures marked with * are based on less than 20 cases.

Table 11: Traditional Method Users as a Percentage of All Currently Married Women and All Users by Method - WFS, CPS, DHS

	WFS 1975		CPS 1982		DHS 1987	
Method	All Women	All Users	All Women	All Users	All Women	All Users
Safe period	8.9	26.0	14.2	24.5	14.9	24.4
Withdrawal	1.6	4.6	5.1	8.8	3.4	5.6
Other	3.6	10.5	6.7	11.6	2.0	3.3
Total	14.1	41.2	26.1	44.9	20.3	33.3

Table 12: Traditional Method Users as a Percentage of All Currently Married Women and All Users by Method and Age

	<25	25-34	35+
WFS			
Safe Period	4.4	10.6	7.3
Withdrawal	1.5	2.3	0.8
Other	1.4	2.4	3.1
All Methods	7.4	15.2	11.2
CPS			
Safe Period	14.0	14.8	13.8
Withdrawal	5.3	5.8	4.4
Other	7.9	5.7	7.3
All Methods	27.1	26.3	25.5
DHS			
Safe Period	10.8	15.2	16.0
Withdrawal	3.3	3.8	3.0
Other	1.1	1.1	3.1
All Methods	15.2	20.2	22.0

Table 13: Traditional Method Users as a Percentage of All Currently Married Women and All Users by Method and Number of Living Children

	Number of Living Children		
	1 -2	3 -4	5+
WFS			
Safe Period	11.6	12.3	5.8
Withdrawal	2.1	1.7	1.2
Other	2.6	4.0	5.4
Total	16.2	17.9	12.4
CPS			
Safe Period	20.4	13.3	9.2
Withdrawal	6.4	6.1	2.8
Other	7.8	6.7	7.7
Total	34.5	26.1	19.8
DHS			
Safe Period	22.0	13.3	8.5
Withdrawal	4.9	2.9	2.2
Other	1.1	2.1	4.3
Total	28.0	18.4	14.9

Table 14: Traditional Method Users as a Percentage of All Currently Married Women and All Users by Method and Place of Residence - WFS, CPS, DHS

	Urban	Rural	Estate
WFS			
Safe Period	11.5	9.6	0.2
Withdrawal	1.2	1.8	0.5
Other	4.3	3.4	3.5
All Methods	16.9	14.9	4.2
CPS			
Safe Period	16.6	14.8	1.8
Withdrawal	3.4	6.0	2.9
Other	7.1	6.2	9.7
All Methods	27.1	27.1	14.4
DHS			
Safe Period	19.4	15.0	1.4
Withdrawal	2.4	3.8	0.6
Other	1.4	1.8	5.5
All Methods	23.2	20.6	7.5

Table 15: Traditional Method Users as a Percentage of All Currently Married Women and All Users by Method and Education - WFS, CPS, DHS

	No Schooling	Primary	Secondary	Higher
WFS				
Safe Period	2.2	6.0	13.3	18.9
Withdrawal	0.2*	1.3	2.2	3.1
Other	4.5	4.3	2.7	2.5*
Total	6.8	11.6	18.2	24.5
CPS				
Safe Period	6.0	10.7	16.9	22.3
Withdrawal	3.5	3.8	6.7	5.7
Other	8.5	7.3	6.5	4.7
Total	18.0	21.7	30.1	32.8
DHS				
Safe Period	4.5	9.3	15.7	24.9
Withdrawal	1.7	2.5	3.8	4.6
Other	3.8	2.5	1.8	1.0
Total	10.0	14.3	21.4	30.5

Table 16: Traditional Method Users as a Percentage of All Currently Married Women and All Users by Method and Work Status - WFS, CPS, DHS

	Did Not Work	At Home	Away From Home
WFS			
Safe Period	9.5	9.6	7.3
Withdrawal	2.1	1.3	0.7
Other	3.4	3.5	4.2
All Methods	14.9	14.4	12.2
CPS			
Safe Period	15.3	14.3	11.2
Withdrawal	5.6	4.3	4.2
Other	6.8	5.9	6.8
All Methods	27.7	24.6	22.2
DHS			
Safe Period	14.5	21.5	15.9
Withdrawal	3.5	4.7	2.5
Other	1.9	-	2.8
All Methods	20.0	26.2	21.2

Table 17: Prevalence Rates of Traditional Methods Standardized on WFS Sample Composition by Age, Living Children, Education, and Sector

Standardized on	CPS	DHS
Age	26.0	20.3
No. of Living Children	24.6	19.0
Sector	25.7	19.7
Education	24.6	17.5
Work Status	25.7	21.4
Observed	26.1	20.3

Table 18: Percentage of Currently Married Women Currently Using a Contraceptive Method - WFS, CPS, DHS.

Method	WFS 1975	CPS 1982	DHS 1987
All methods	32.0	54.9	61.7
Any modern method	18.8	30.4	40.6
Any traditional method	13.2	24.5	21.1

Table 19: Age Specific Fertility Rates Based on Survey Data and Estimated Rates Based on Contraceptive Prevalence

Age group	WFS 1974			CPS 1981			DHS 1982-1987		
	O	E	D	O	E	D	O	E	D
15-19	31			34			38		
20-24	146	247	41	172	158	-6	147	205	28
25-29	161	260	38	222	226	2	161	213	24
30-34	158	192	18	177	159	-11	122	152	19
35-39	126	138	9	99	95	-4	71	90	21
40-44	43	50	14	37	31	-19	23	23	21
45-49	6	9	33	0	12	-	3	3	0
TFR	3.4	4.5		3.7	3.7	0	2.8	3.4	0

Note: O = observed; E = estimated; D = difference between estimated and observed as a percentage of the estimated value.

Table 20: Observed and Estimated Contraceptive Prevalence - WFS, CPS, DHS

	WFS	CPS	DHS
TFR	3.4	3.7	2.8
Observed Prevalence	32.0	54.9	61.7
Estimated Prevalence	55	51	63

Table 21: Estimates of TFR for Various Periods Between 1962 and 1981

Method of Estimation	Period	Sri Lanka
Vital Statistics	1962-1964	5.0
Rele's method $\frac{C5-9}{W20-45}$	1962-1966	4.9
Own-children method	1966-1970	4.7
Rele's method $\frac{C0-4}{W15-49}$	1967-1971	4.0
Bogue-Palmore method	1971	4.1
Vital statistics	1970-1972	4.1
Own-children method	1971-1975	3.9
Rele's method $\frac{C5-9}{W20-54}$	1972-1976	3.7
Own-children method	1976-1980	3.5
Rele's method $\frac{C0-4}{W15-49}$	1977-1981	3.5
Vital statistics	1980-1982	3.4
Bogue-Palmore method	1981	3.5

Source: De Silva, S. (1986). "Levels and trends of fertility in Sri Lanka: A district-level analysis." Asian Population Studies Series 62-F. Bangkok Table 3, P37.

Table 22. Percentage of Currently Married Exposed Women Using Contraceptives - FHBS (1974) and WFS (1975)

	FHBS	WFS
Total women	3740	4709
Percentage currently using	45.2	58.6
Pill	3.0	2.0
IUD	7.5	6.2
Condom	2.9	3.0
Sterilization	11.5	12.8
Injection	0.2	0.4
Safe period	15.4	10.4
Withdrawal	8.4	1.9
Other	5.9	4.7

Source: Immerwahr, G.(1981). "Contraceptive use in Sri Lanka." WFS Scientific Reports No. 18 P22.

Table 23. Percentage of Currently Married Women 15-44 Years Using Specific Methods CPS, (Feb-March 1982), FHIS (Oct 1981-Feb 1982), and SLCS (1985).

Method	FHIS	CPS	CPS(a)	SLCS
All methods	42.7	54.9	61.6	69.0
Modern	30.2	30.4		42.9
Pill	2.2	2.6	2.8	2.8
IUD	2.8	2.5	3.5	2.6
Condom	2.5	3.3	3.2	1.9
Injection	1.3	1.4*	1.2	0.9
Female sterilization	17.9	17.0	20.3	28.5
Male sterilization	3.5	3.7	4.3	6.0
Traditional	12.5	24.5	26.1	26.1
Withdrawal	3.1	4.7	-	-
Rhythm	9.2	13.0	-	-
Other	0.2	6.8	-	-

Note: * Includes other (female) modern methods.
- Available for methods and method combinations because SLCS searched especially for method combinations.

a) Percentage distributions are for currently married women 18-49 years who are married for three years or more and living in the 17 districts covered in the 1985 survey.
b) Excludes 2 percent who were using condom in combination with traditional methods(i.e. safe period or withdrawal).
c) Includes 2.0 percent who were using condom in combination with safe period or withdrawal.

Source: ESCAP "The use of contraception in the Asian and Pacific Region." Population Research Leads. No 21. 1985, and Sri Lanka Department of Census and Statistics (1987) Sri Lanka Contraceptive Survey 1985. Colombo. Table 1.1.

Fig.1

Women Using Traditional Methods as a Percentage of All Currently Married Women, by Age

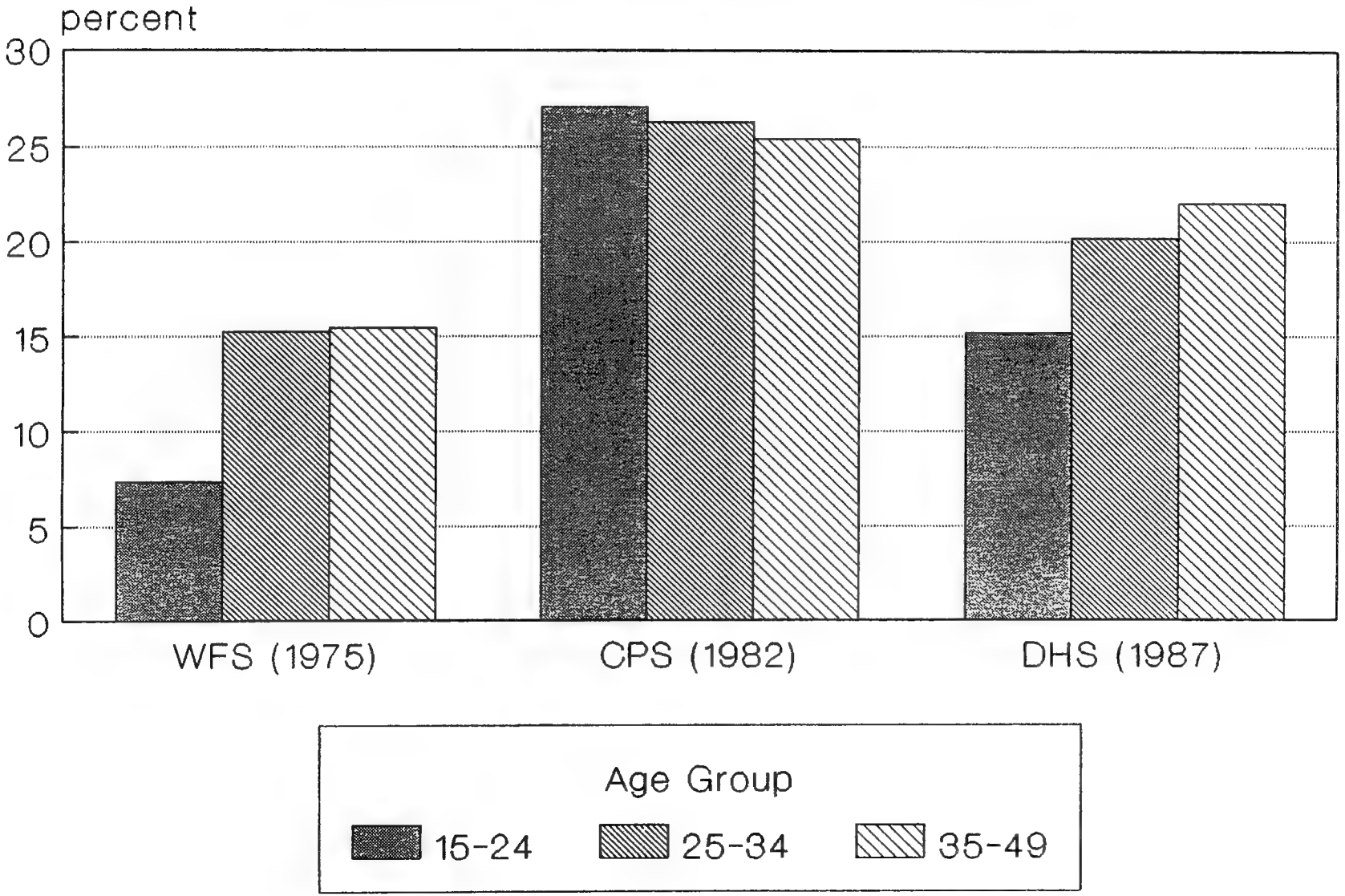


Fig.2

Women Using Traditional Methods as a Percentage of All Currently Married Women, by Education

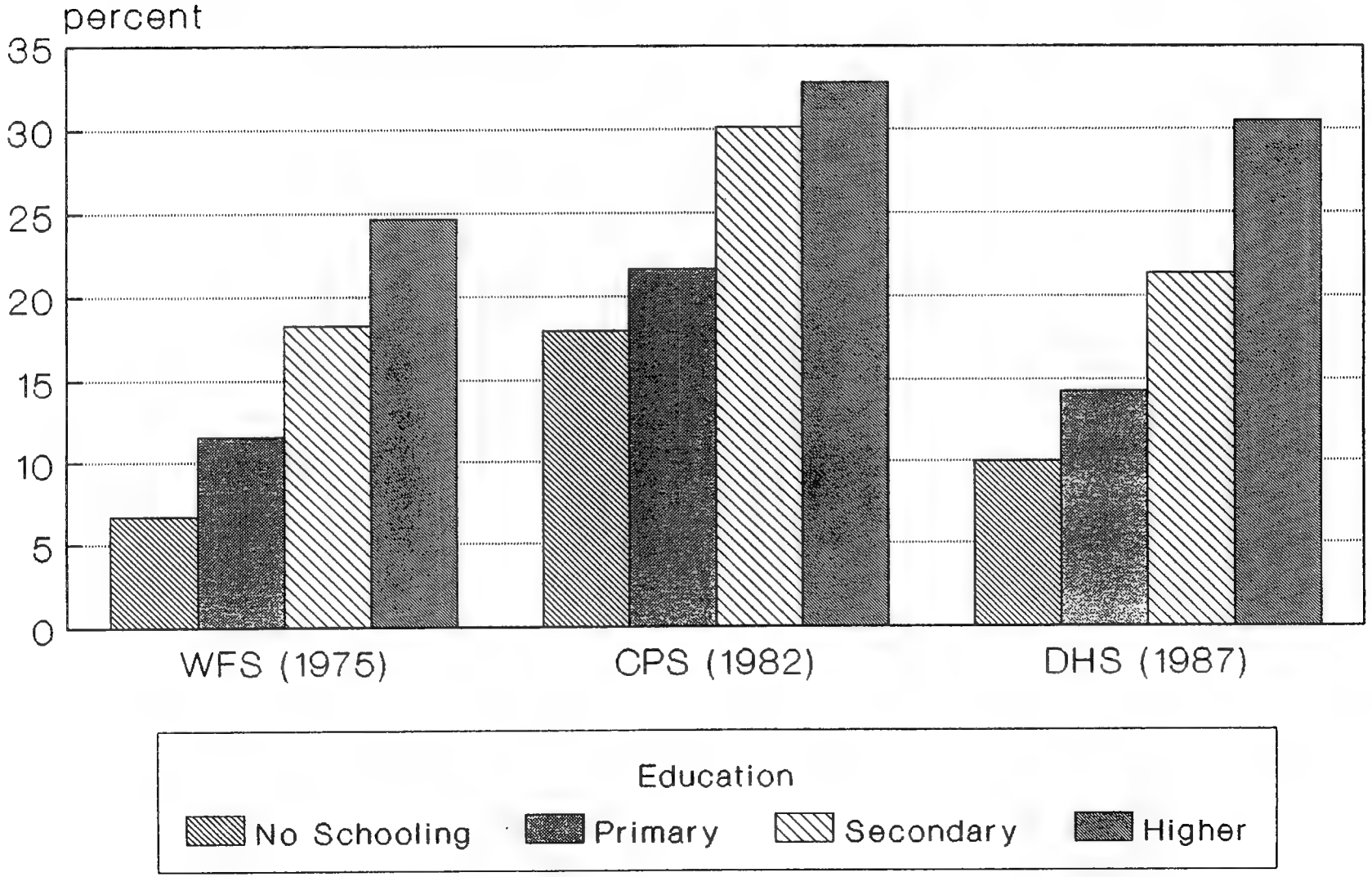


Fig.3

Women Using Traditional Methods as a Percentage of All Currently Married Women, by Age and by Education

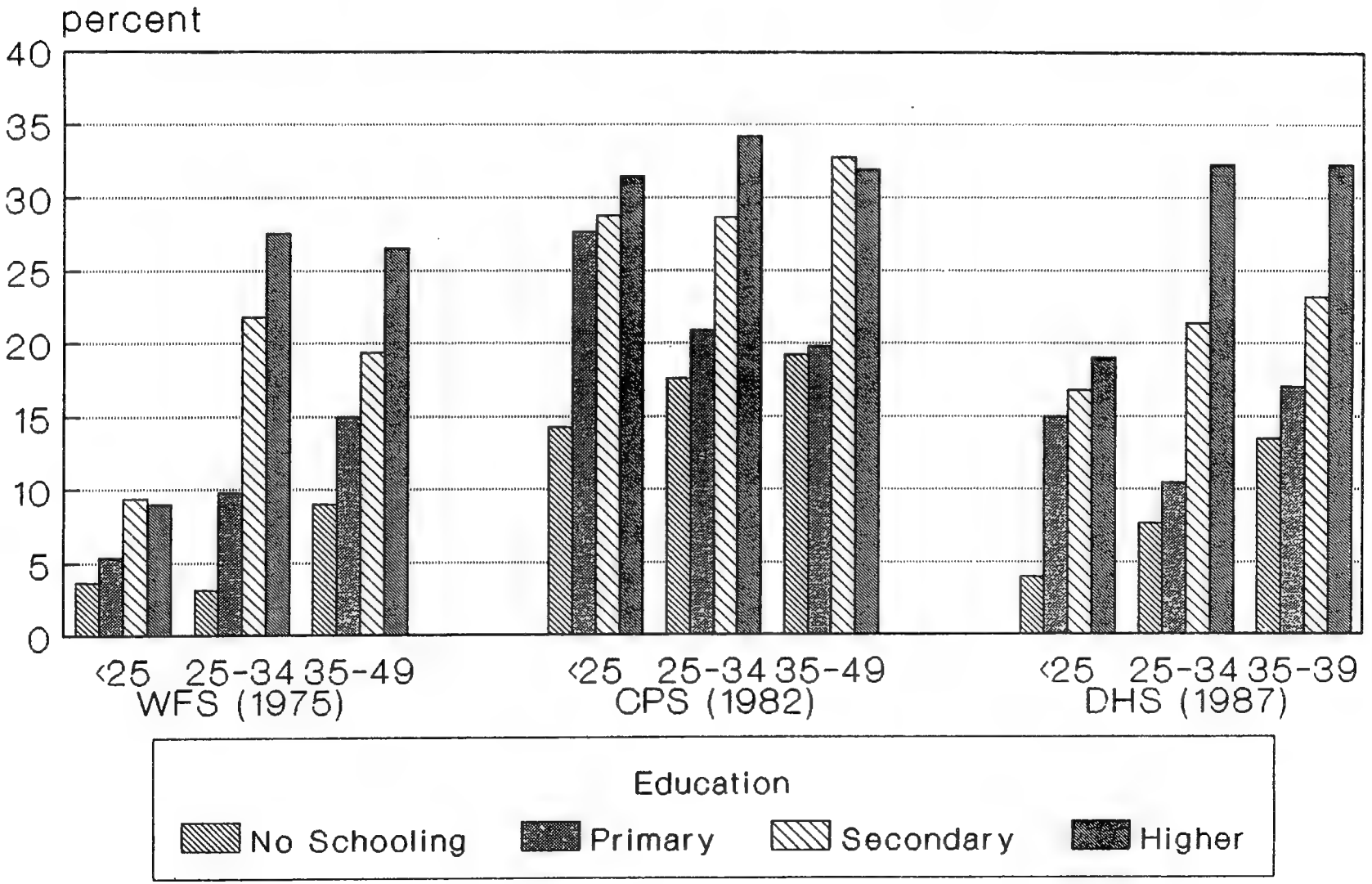


Fig.4

Women Using Traditional Methods as a Percentage of All Women Using Contraception, by Parity and by Education

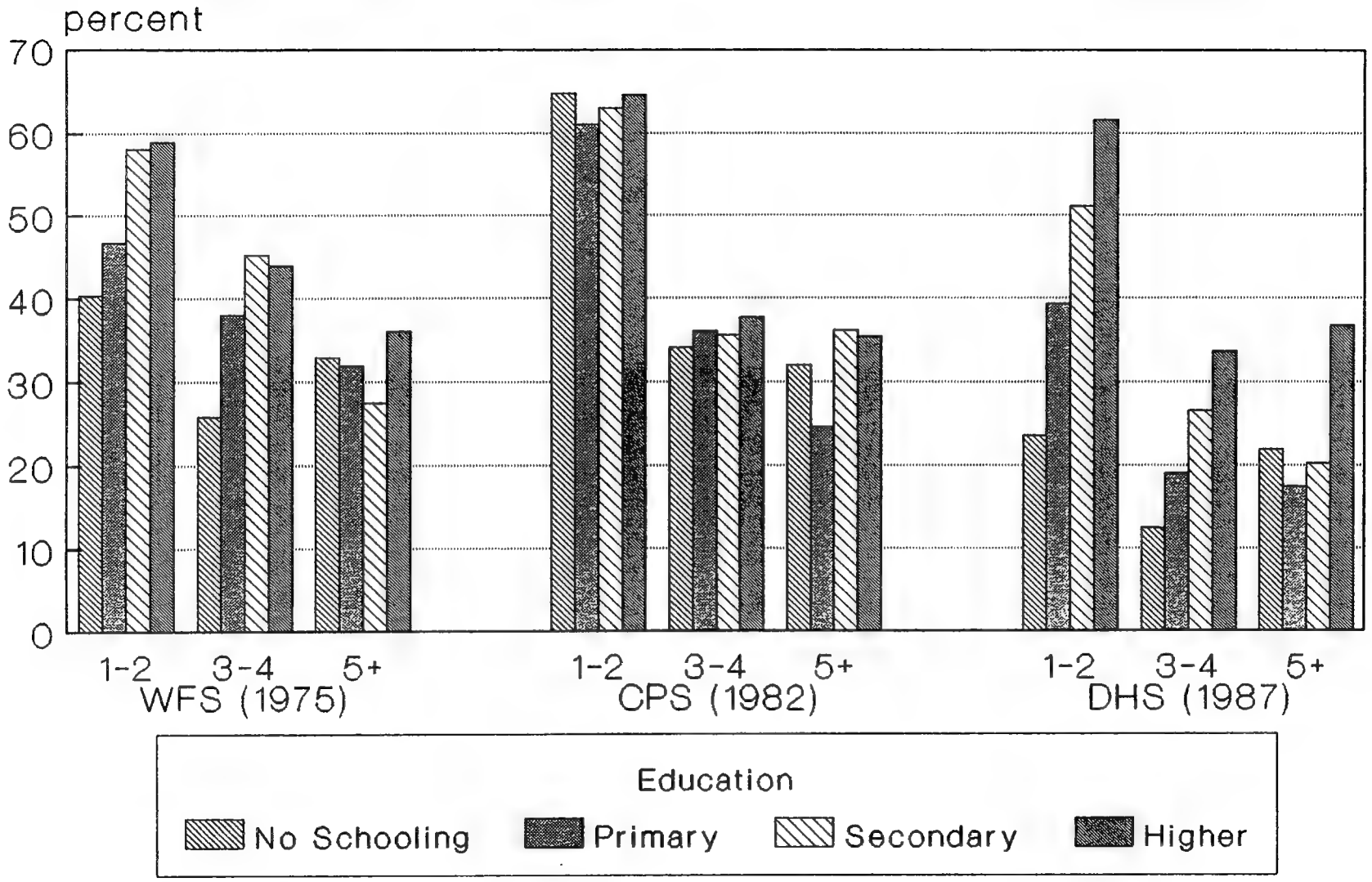


Fig.5

Women Using Traditional Methods as a Percentage of All Women Using Contraception, by Work Status and by Education

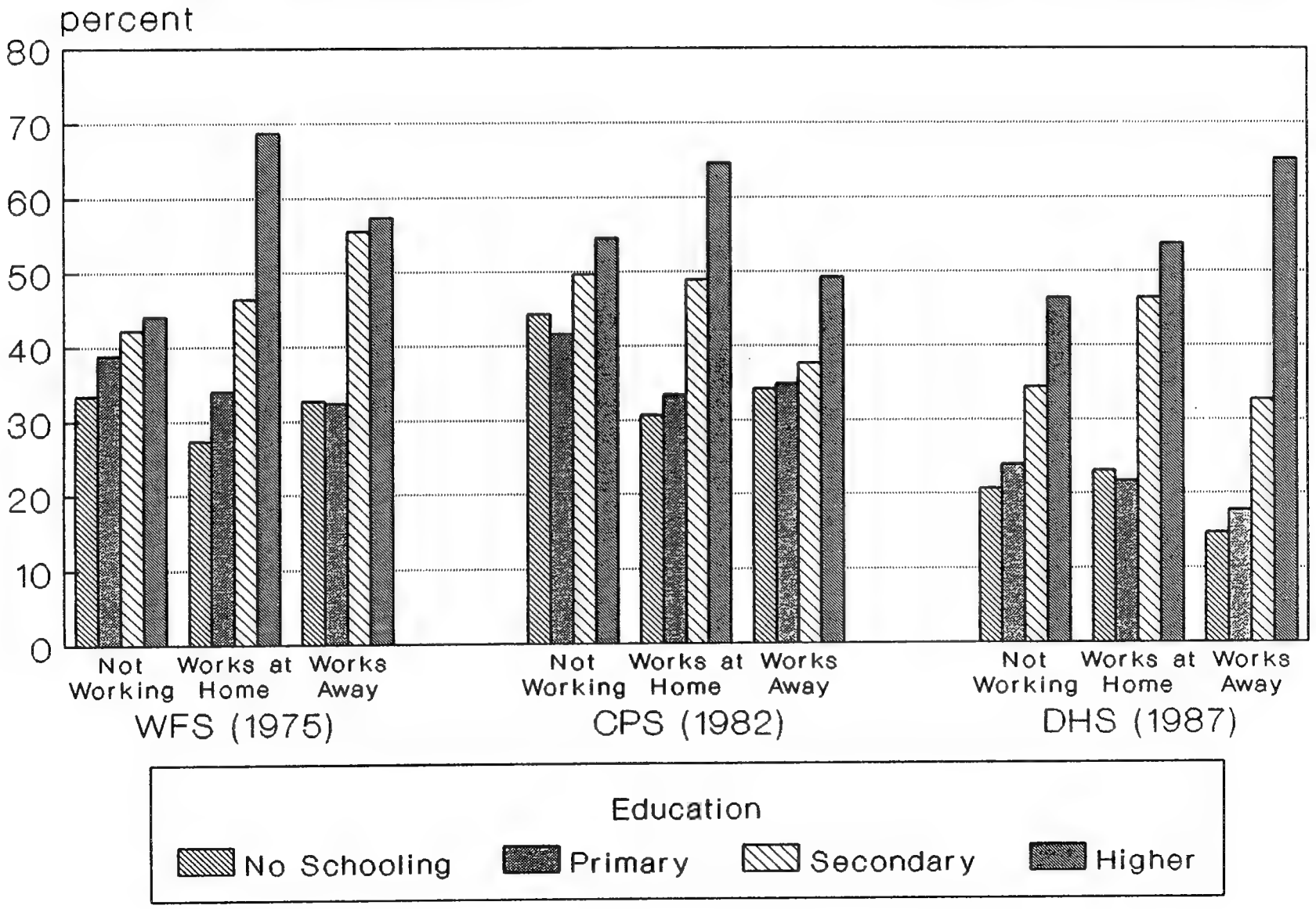


Fig.6

Traditional Method Users as a Percentage of All Married Women, by Method

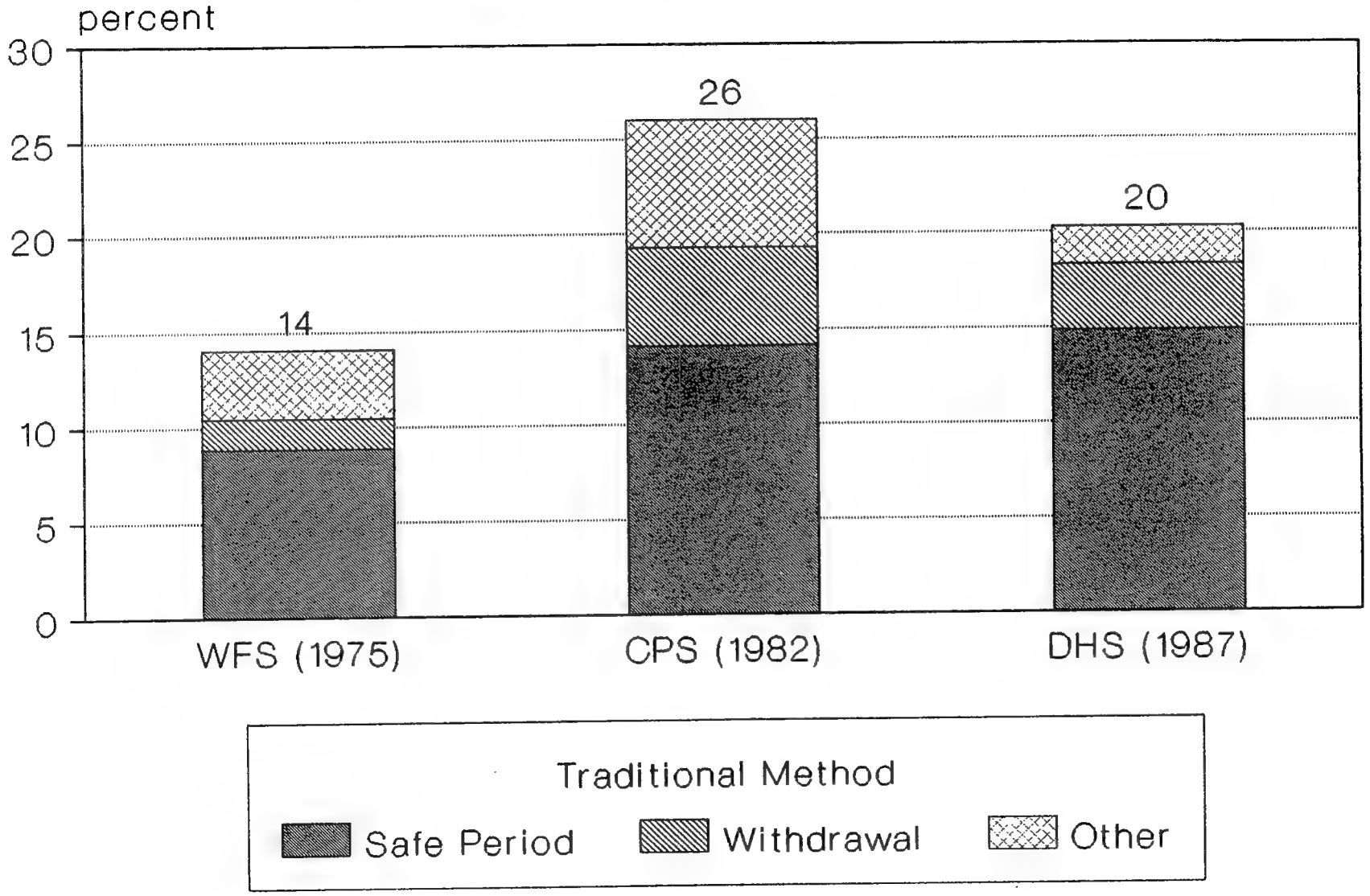


Fig.7

Women Using the Safe Period as a Percentage of All Users, by Education

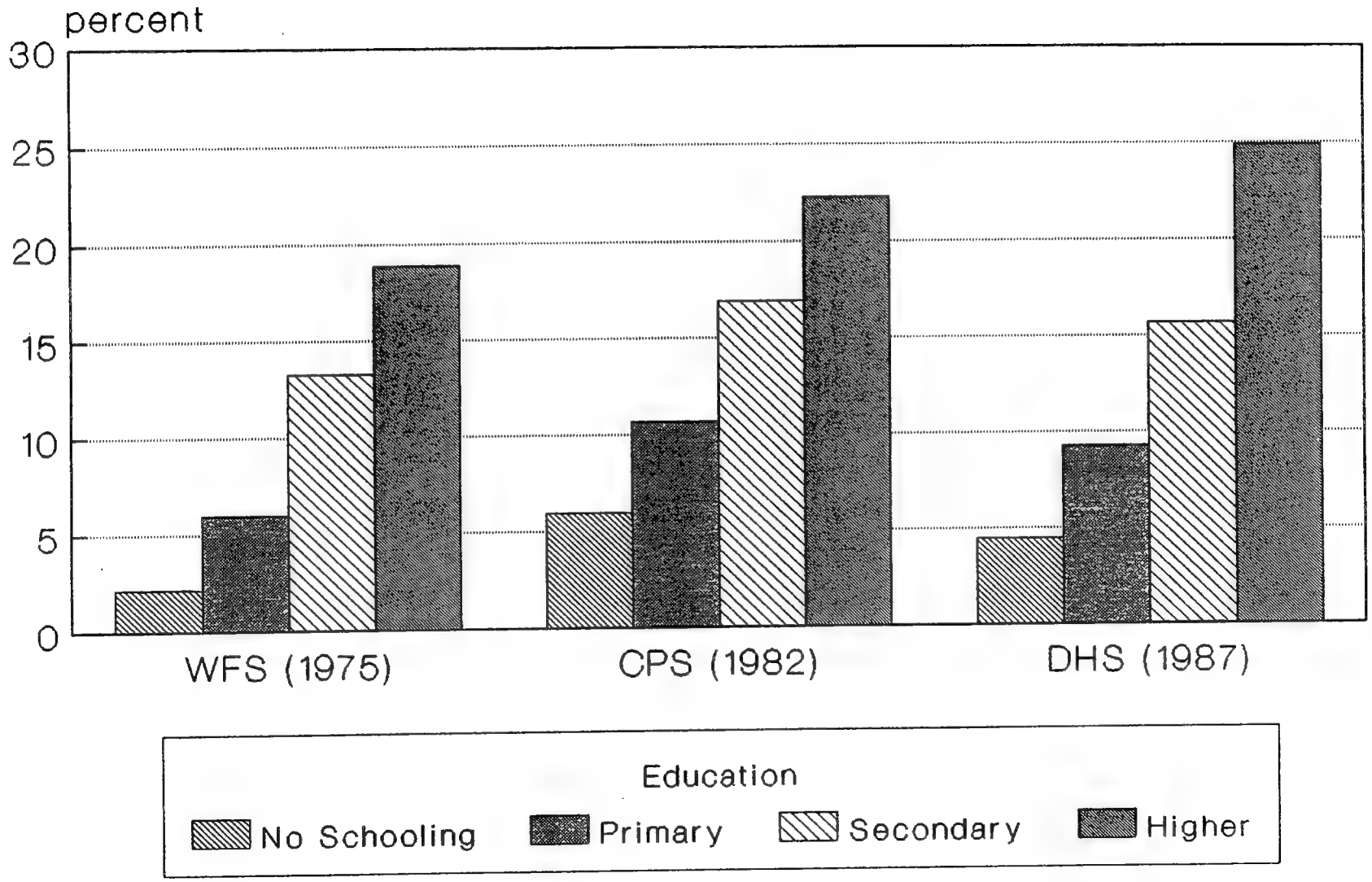


Fig.8

Trends in TFR and Contraceptive Prevalence
1974-1987

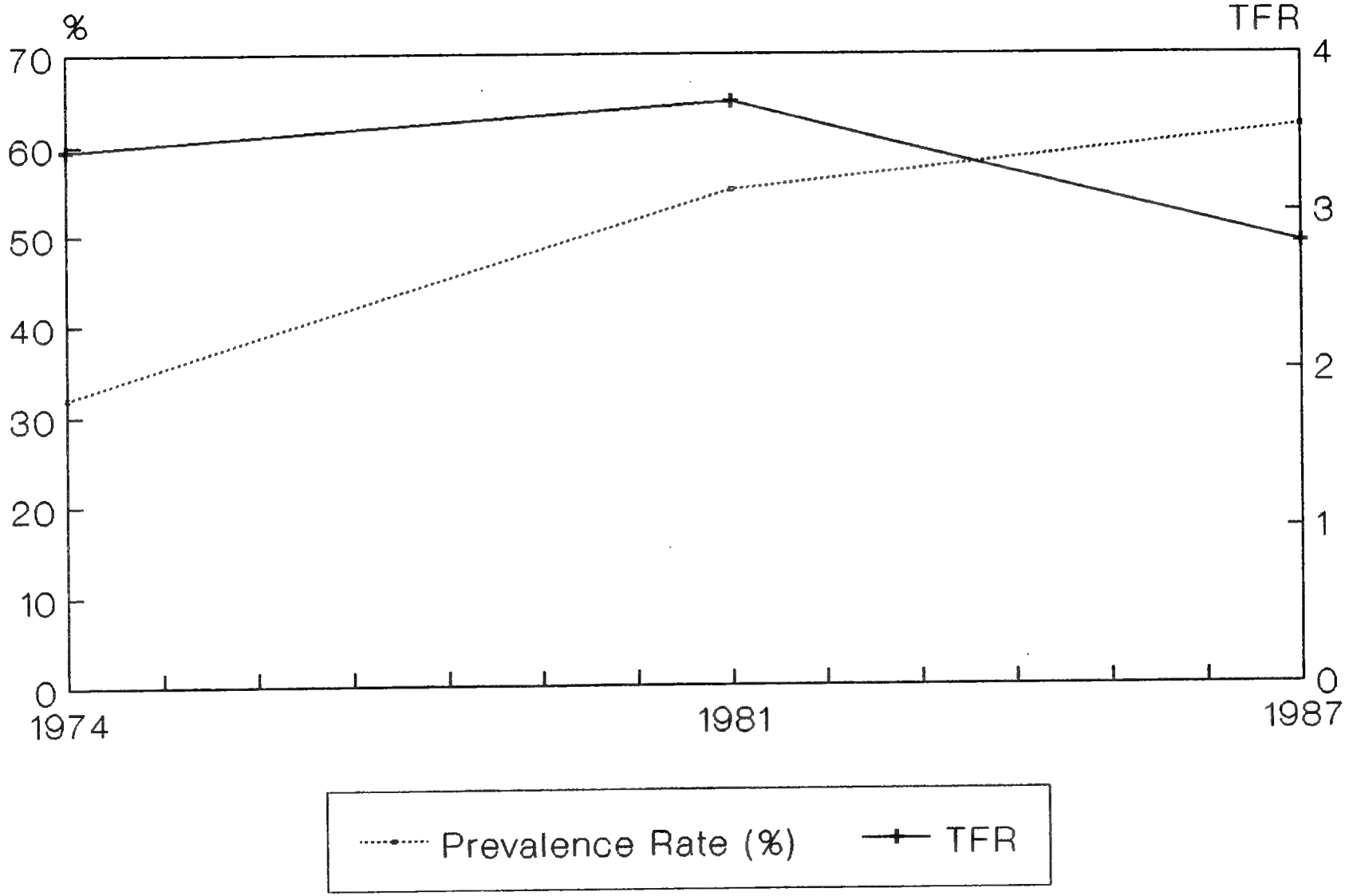
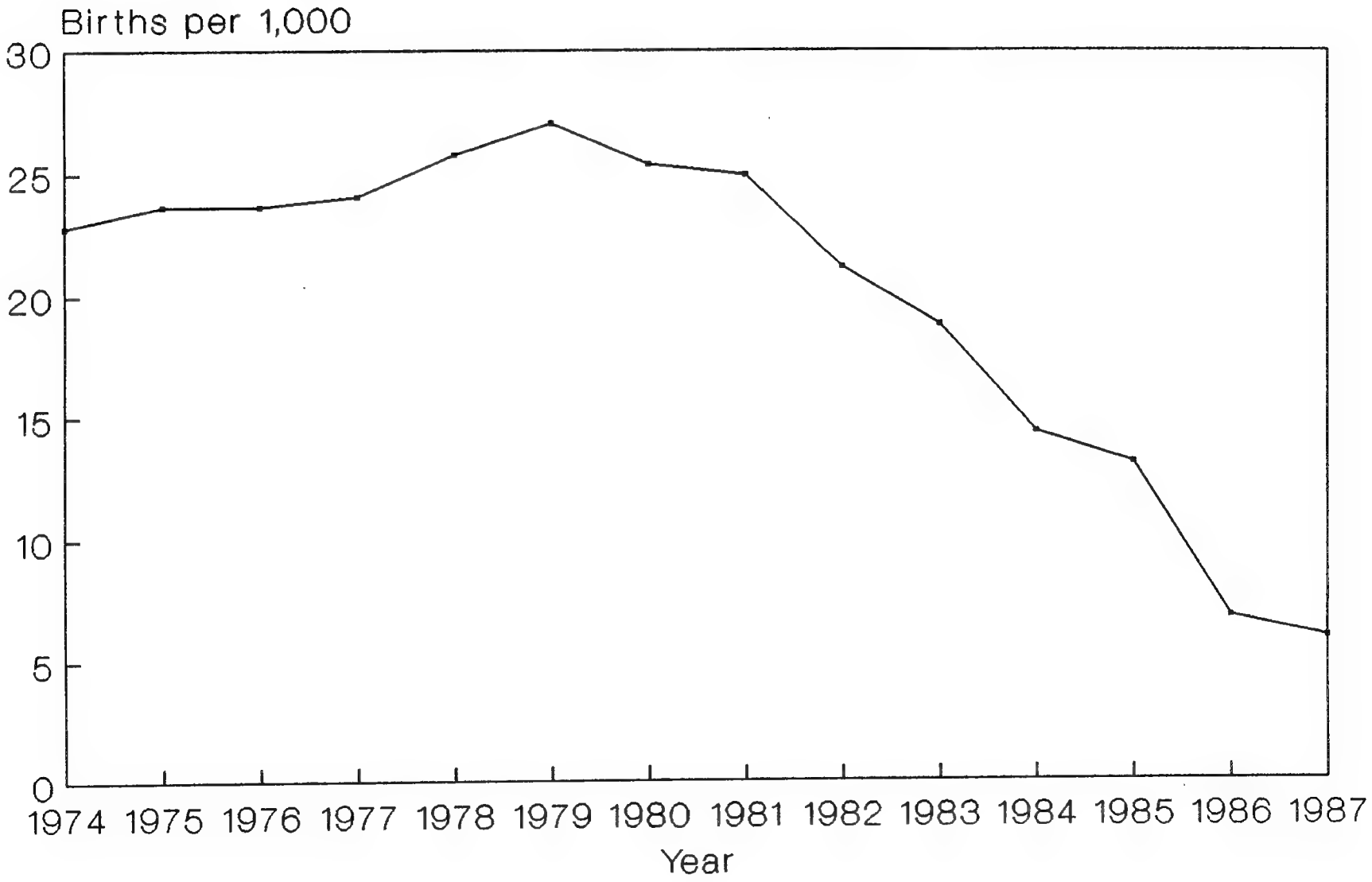


Fig.9

Trends in Crude Birth Rate 1974-1987



FERTILITY TRANSITION IN INDONESIA
Trends in Proximate Determinants of Fertility

Sri Moertiningsih Adioetomo
Ayke S. Kitting
Salman Taufik

FOREWORD

Important interrelationships between population and development are widely recognized. A key component of this is the impact of development and structural change on current fertility. The Indonesian government's efforts in both family planning and other development programs have resulted in recent rapid fertility declines. The crude birth rate has declined from 44 per thousand in 1971 to 29 in 1985. This success leads naturally to questions regarding the factors influencing it. Some argue that development has contributed primarily to the current situation while others argue that family planning is the most important factor.

It is true that the government has made a strong commitment to implementing a national family planning program to lower fertility since 1971, but its commitments to improvements in health, education, and other economic infrastructure have also been strong. With this study, we hope to provide a clearer picture of how these reductions in fertility have occurred. Perhaps this will help others evaluate the relative importance of alternative strategies towards economic and demographic development.

The Demographic Institute, Faculty of Economics University of Indonesia has been honored to do the research on "Fertility Transition in Indonesia, Trends in Proximate Determinants of Fertility, Based on The 1987 NICPS/DHS." We are grateful for the grant from the Population Council No. CP88.08W (under a subcontract from USAID).

Our appreciation goes to Ms. Sri Moertiningsih Adioetomo as the principal Investigator with the diligent and capable assistance of Ms. Ayke S. Kitting and Mr. Salman Taufik. The same appreciation goes to Dr. Gour Dasvarma of the Population Council in Jakarta, Dr. John Bongaarts and Mr. Parker Mauldin of the Population Council, New York who have given invaluable help in the process.

Last but not least we would like to thank Ms. Sulistinah I. Achmad who helped us preparing the proposal.

M. DJUHARI WIRAKARTAKUSUMAH Ph.D., Director.

I. INTRODUCTION

I.1. The Fertility Decline

Recent studies on fertility in Indonesia confirmed a decline in fertility (McNicoll & Singarimbun, 1982; Hugo, et al., 1987; Adioetomo and Suprobo, 1987). The crude birth rate has declined from 44 per thousand population in 1971 to 29 in 1985 (Central Bureau of Statistics, 1983; 1988). Before the first national family planning program was launched in 1971, an Indonesian woman could expect to bear 5 to 6 children, but today she is more likely to have 3 to 4 children only. This decline is found in most provinces with the greatest decline achieved in Java and Bali. The age pattern of fertility is also changing, indicating a change in the reproductive behavior of Indonesian women. At the beginning of the family planning program, the decline in fertility was mostly contributed by younger women as a result of an increase in age at marriage. In the late 1970's the decline was attributable to the reduction in marital fertility contributed by older women, showing a tendency toward family limitation practice (Adioetomo & Suprobo, 1987).

Since 1971 the government has made a strong commitment to implementing a national family planning program to lower fertility. The implementation has been conducted in three stages. The first stage, begun in 1971, was initiated in the provinces of Java and Bali. The second stage began in 1974 and covered most of the provinces in Sumatra, Kalimantan, and Sulawesi (called Outer Java-Bali 1 or LJB1). The third stage began in 1979 and covered the remaining provinces of Jambi, Bengkulu, Riau, in Sumatra; East and Central Kalimantan, and Eastern Indonesian Islands (called Outer Java-Bali 2 or LJB2). The subsidized contraceptive services, building up of local government linkages with community groups, the development of an explicit communication campaign to legitimize contraception and the introduction of the concept of a small family size norm, have resulted in a dramatic increase in contraceptive use (McNicoll and Singarimbun, 1983; Hugo et al., 1987). Meanwhile, socioeconomic development carried out since 1969 have achieved substantial progress. Average economic growth reached 7 percent per annum during 1970-1980, but decreased to 4 percent afterwards. Rapid infant mortality decline (from 140 in 1971 to 70 per thousand births in 1985) indicate improvements in socioeconomic welfare, increased literacy and a continuous rise in educational attainment, which in turn have led to an increase in age at first marriage and use of contraception (Adioetomo, 1984).

The success of the population development programs have, no doubt, contributed to the fertility decline. However, the mechanisms through which development factors have contributed to this decline and how much each of the factors has contributed to the decline remain unknown. In the long run economic development plays a decisive role in fertility reduction, but in the short run it is individual behavior, like age at marriage, practice of breastfeeding, postpartum abstinence, frequency of intercourse and contraceptive use, which more directly affect fertility (Bulatao, 1984). An examination of the changes in patterns of reproductive behavior will provide a better understanding of the causes of fertility decline occurring in Indonesia. Bongaarts (1978, 1983) has developed a model to measure the effects of a number of individual behavioral patterns on fertility (which he calls proximate determinants of fertility). The model allows the proximate determinants to be decomposed, thereby allowing a better understanding of the causes leading to changes in fertility. Proximate determinants of fertility are a set of biological and behavioral factors through which social, economic and environmental variables affect fertility. If a proximate determinant changes (such as contraceptive used or marriage patterns) then fertility necessarily changes also (provided that other proximate determinants remain constant) even though this is not necessarily the case for a socioeconomic determinant. Fertility differences among populations and trends over time can then be traced to variations in the proximate determinants (Bongaarts and Potter, 1983).

1.2. Objectives of the Study

The objectives of this study are to estimate proximate determinants of fertility in Indonesia from the 1987 National Indonesia Contraceptive Prevalence Survey (1987 NICPS). For Java and Bali, the results will be compared to the 1976 Indonesia Fertility Survey's estimates of proximate determinants. An analysis of the trends in the proximate determinants will provide a better understanding of the causes of fertility decline in Java-Bali during 1976-1987.

This study therefore aims to provide:

1. Measures of fertility and its proximate determinants for Indonesia (National, Java-Bali and the Outer Java-Bali levels), which will produce benchmark data to be compared with the second NICPS to be conducted in 1991.

2. An analysis of the trends in the proximate determinants of fertility in Java-Bali and of causes of fertility decline during 1976-1987.

I.3. Data Source

The 1987 National Indonesia Contraceptive Prevalence Survey was conducted by the Central Bureau of Statistics in coordination with the Institute for Resource Development on request of the Indonesian National Family Planning Coordinating Board. The survey was funded by the USAID and the UNFPA. The survey covered 20 out of 27 provinces in Indonesia. The provinces of Jambi, Central and East Kalimantan, East Nusatenggara, Maluku, Irian Jaya and East Timor, (seven among the latest 11 provinces covered by the family planning program and populated with less than 7 percent of the total population), were excluded.

A sample of about 15,000 households taken from the 1987 National Socioeconomic Survey (SUSENAS) frame, were selected to get 12,065 eligible women as respondents (ever married women aged 15-49). Among these eligible women, 11,884 were successfully interviewed (Central Bureau of Statistics, National Family Planning Coordinating Board and The Demographic Health Survey, IRD, 1989 abbreviated as NICPS/DHS Report).

The 1987 NICPS has two basic questionnaires, i.e., a household questionnaire which recorded information on all household members, and an individual questionnaire which recorded detailed information on eligible women who were identified from the household questionnaires. The individual questionnaires collected information on the respondent's background characteristics, reproductive history, knowledge and practice of family planning, breastfeeding practices, marriage, fertility preferences, as well as husband's background characteristics and respondent's work experiences. Fieldwork was initiated in mid September 1987 and ended in the third week of December 1987 (NICPS Report).

For the purpose of this analysis, the data prepared by the IRD were processed using the SAS package program at the Demographic Institute, University of Indonesia.

II. Theoretical Framework - The Model

Proximate determinants are the biological and behavioral factors through which socioeconomic and environmental variables affect fertility. Bongaarts' version of proximate determinants of fertility is based on Louis Henry's concept of natural fertility and reproductive behavior (Henry, 1961 in Bongaarts and Potter, 1983). Natural fertility according to Louis Henry is fertility achieved in the absence of deliberate birth control. Controlled fertility, on the other hand, is fertility where the behavior of couples is bound to parity, that is, the number of children they have or have targeted. Behavior that affects fertility such as prolonged breastfeeding, abstinence during lactation and various taboos affecting frequencies of intercourse, but which is independent of parity, is considered, according to this definition, to be consistent with natural fertility.

A woman's reproductive life span begins with menarche, marriage, birth of the first child, second, third, ..., last child, and ends with permanent sterility. Between births, a woman experiences a period of postpartum amenorrhea of about 1,5 to 2 months. This duration of postpartum amenorrhea is sometimes prolonged with the practice of breastfeeding and postpartum abstinence. Postpartum amenorrhea, breastfeeding and postpartum abstinence determine the length of postpartum infecundability, a period during which a woman has no risk of becoming pregnant. A period of waiting time to conception follows the return of ovulation and once conception occurs, a nine months gestation period precedes the birth of the following child. Conception, however, does not always result in a successful birth; thus intrauterine mortality is followed by another series of periods of postpartum infecundability, waiting time to conception and gestation. In a controlled fertility population, this process is influenced by the use of contraception and/or induced abortion. Summarizing this process, then, the actual level of fertility achieved by a woman or a group of women in a population is assumed to be influenced by 7 proximate determinants:

1. Marriage and marital disruption.
2. Onset of permanent sterility.
3. Postpartum infecundability.
4. Use and effectiveness of contraception.
5. Induced abortion.
6. Waiting time to conception (a function of natural fecundability and frequency of intercourse).
7. Spontaneous intrauterine mortality.

The first two of these factors determine the duration of the reproductive period and the other five determine the rate of childbearing and the duration of birth intervals. The seven variables together constitute a complete set of variables through which socioeconomic and environmental factors could affect fertility (Bongaarts and Potter, 1983, pp. 5).

Among societies, the level of fertility varies due to variation in marriage patterns and in the level of natural marital fertility. Postponement of marriage and marital disruption shorten the length of exposure to childbearing and result in a level of fertility below the theoretical maximum level of natural marital fertility. Natural marital fertility is affected by postpartum infecundability, waiting time to conception (frequency of intercourse and natural fecundability). In a controlled fertility situation, deliberate control of marital fertility is carried out through the use of contraception or the practice of induced abortion. To examine the impact of proximate determinants on fertility, Bongaarts has developed an aggregate fertility model that describes the relationship between fertility and the proximate determinants. The effect of deliberate marital fertility control (the use of contraception and induced abortion) are taken into account and combined in a model which focuses on four proximate determinants, that is, marriage, contraception, induced abortion, and postpartum infecundability. Natural fecundability, intrauterine mortality and the onset of sterility, which are considered to have only a small impact on the level of fertility, are treated as secondary factors.

Figure 1 illustrates the mechanisms through which the proximate determinants influence the level of fertility in a society (Bongaarts and Potter, 1983, pp 79). If all the proximate determinants are operating, the level of fertility could be as low as the level indicated by TFR. If, however, all of the women married at 15 years (no delayed marriage), the level of fertility would increase to the level indicated by TM. Moving further if no contraceptive are used and induced abortion is not practiced, the level of fertility would rise to the level of the natural marital fertility rate, TN. Finally, if the society relaxes its practice of breastfeeding and postpartum abstinence, the level of fertility would further increase to TF, the total fecundity rate. This model can be quantified through the following equation:

$$TFR = Cm \times Cc \times Ca \times Ci \times TF \qquad (1)$$

where: TFR is the total fertility rate. In this study the TFR will be directly calculated from the birth histories collected in the survey.

Cm is the index of marriage. Cm equals 1 if all women of reproductive age are married and 0 in the absence of marriage. In other words,

$$Cm = [m(a)\ g(a)] / [g(a)] \qquad (2)$$

where m(a) represents the age specific proportions of women currently married and g(a) represents the age specific marital fertility rates.

Due to the absence of information on marital histories in the 1987 NICPS, in this study the proportions married are assumed to be the same as those found in the 1985 Intercensal population survey (SUPAS).

Cc is the index of contraceptive use. Cc equals 1 in the absence of contraception and 0 if all fecund women use 100% effective contraception. In this model,

$$Cc = 1 - 1.08\ u\ e \qquad (3)$$

where $v = [f(a)xu(a)xe(a)]/[f(a)]$, (4)

and where f(a) is the number of married females aged a, u(a) is the contraceptive prevalence rate among married females aged a, and e(a) is the average use effectiveness of contraception among married females aged a.

Ca is the index of induced abortion. Ca equals 1 in the absence of induced abortion and 0 if all pregnancies are aborted. Due to the lack of information on induced abortion in the 1987 NICPS, the computation of c(a) is omitted from this analysis. However, the effect of Ca will be automatically subsumed in the estimation of TF.

Ci is the index of postpartum infecundability. Ci equals 1 in the absence of breastfeeding and postpartum abstinence and 0 if the duration of infecundability is infinite. In this model,

$$Ci = 20 / (18.5 + i) \quad (5)$$

where i is the average duration of postpartum infecundability caused by breastfeeding or postpartum abstinence (in months), and where

$$i = 1.753\ e\ (0.1396b * 0.001872\ b^2) \quad (6)$$

where b is the mean duration of breastfeeding (in months).

Equation (6) will be used only when there is no direct information on postpartum infecundability. In the 1987 NICPS, mean duration of postpartum infecundability is available through the computation of mean duration of postpartum insusceptibility, i.e., women who were still amenorrheic or still abstaining. This study will use these two kinds of computation, i.e., equation (6) will be computed especially for the comparison of proximate determinants with the results of the 1976 Indonesia Fertility Survey (for Java-Bali only). The direct postpartum infecundability will be computed for major regions to provide for comparison with the coming 1991 NICPS. The mean duration of breastfeeding as well as the mean postpartum insusceptible period will be calculated using the current status method (the prevalence method), i.e., the number of women still breastfeeding or still amenorrheic/abstaining at the time of the survey divided by the average number of children born within 36 months before the survey.

With equation (1) estimates of proximate determinants will be made for the major regions of Indonesia and for Java-Bali; the results will be compared to those calculated from the 1976 IFS (Casterline et al., 1982). Examination of the changes in proximate determinants as well as the decomposition of the changes will give an estimate of the contribution of each of the proximate determinants in the fertility decline experienced in Java-Bali.

The comparison will be made through the following equations:

$$TFR(87)/TFR(76) = [Cm(87)/Cm(76) \times [Cc(87)/Cc(76) \times [Ci(87)/Ci(76)] \times [Tf(87)/Tf(76)]. \quad (7)$$

or $$Pf = Pm + Pc + Pi + Pr + I \quad (8)$$

where $Pf = TFR(87) / TFR(76) - 1$ (proportional change in TFR)
$Pm = Cm(87) / Cm(76) - 1$ (proportional change in Cm)

$Pc = Cc(87) / Cc(76) - 1$ (proportional change in Cc)

$Pi = Ci(87) / Ci(76) - 1$ (proportional change in Ci)

$Pr = Tf(87) / Tf(76) - 1$ (proportional change in Tf)

I = interaction term, representing

PmPcPiPr + PmPcPi + PmPcPr + PmPiPr + PcPi + PmPc + PcPi + PiPr + PmPi + PcPr + PmPr + PiPr

Equation (8) can also be utilized to calculate the difference among socioeconomic groups of women. In this study, however, the socioeconomic groups of women will be analyzed only for urban-rural residence.

III. Results from the 1987 NICPS

III.1. Total Fertility Rate

The total fertility rate, as a measure of the actual level of fertility, is an outcome of the variation in the proximate determinants. In this study, the total fertility rate is calculated directly from information on births within 5 years before the survey, using the following equation:

$$TFR = 5 * \sum \frac{b(a)}{f(a)}$$

where:

b(a) is the number of births from women aged a

f(a) is the number of women aged a

The results from the 1987 NICPS show a total fertility rate of 3.4 for Indonesia (Table 1), 2.9 for Java and Bali and 4.3 for Outer Java-Bali1 and 4.5 for Outer Java-Bali2. Rural women have higher fertility than urban women. The differences are less among Java-Bali women (about one half of a child) to about one child among Outer Java-Bali women.

III.2. Age at Marriage and Proportion Marrying

Like other developing agricultural societies, many Indonesian women tend to marry early (Sutarsih Muliakusuma, 1976; Adioetomo, 1981; CBS 1978). Yet, empirical studies noted increasing age at marriage (Kasto, 1982; Mahmud,1983; Mahfuz, 1982). The proportion of never married women aged 15-19 increased from 70 percent in 1980 to 81 percent in 1987. For women aged 20-24, the increase was from 22 percent in 1980 to 35 percent in 1987 (Table 2).

The mean age at marriage increases about 2 years. According to the 1976 IFS, the Java-Bali women married at about 15.3 years, while the 1987 NICPS estimates average age at marriage at 17.85 years. This increase is seen both in urban as well as rural areas. The urban women married about two years later than the rural women (Table 3).

Even though age at marriage has risen, the average age at birth of first child has remained fairly constant. In 1976, the average age at birth of first child for Java-Bali women aged 25-29 was 19.5 (Bongaarts, 1987). The 1987 NICPS records an average of 19.9 years (Table 4). This may be related to a decrease in the difference in the first birth interval., i.e., from marriage to first births. If in 1976, women aged 25-29 years waited on average about 40 months to have their first babies, in 1987 they waited only about 22 months. Speculation on causes of the decline in first birth intervals are: 1) the disappearing practice of arranged marriage which lead to the elimination of delay on consummation of first marriage found in several studies in Java by Hull (1976), 2) Increasing natural fecundity due to a better health status and nutrition, and 3) increasing evidence of premarital conception (Hull and Adioetomo, 1985).

III.3. Age Specific Marital Fertility Rate

Age specific time spent within union are needed to calculate directly the age specific marital fertility rate. However, information on marriage histories are not available from the 1987 NICPS. In this study, the proportions married are assumed to be the same as those in 1985 SUPAS (Intercensal Population Survey) and these are applied to the age specific fertility rates in Table 1 to obtain the estimated age specific marital fertility rates. Table 5 presents the proportion married recorded in the 1985 SUPAS, for the areas covered by the 1987 NICPS only. The estimated age specific marital fertility rates, especially at ages 15 to 19 years, are very inaccurate due to the few cases of ever married women in the sample. Also the distributions of respondents in that age are clustered in ages 17 to 19 years (Table 6). Due to the short average of marital duration, the marital fertility rates for women aged 15-19 years, therefore, do not represent the potential fertility of the whole age group. In this case Bongaarts recommends that the marital fertility rate for women aged 15-19 be taken as 0.75 of the rate for women aged 20-24 (Bongaarts and Potter, 1983). This adjustment reduces the ASMFR 15-19 from 0.422 to 0.202 for Indonesia, from 0.320 to 0.183 in Java-Bali, and from 0.825 to 0.240 for Outer Java-Bali (Tables 7 and 8). This will also reduce the total marital fertility rates from 5.9 to 4.8 for Indonesia, from 4.9 to 4.2 for Java-Bali and from 9.0 to 6.3 for Outer Java-Bali.

The pattern of the estimated age specific marital fertility rates for the urban women in Java is higher than those for the rural women, that is 4.4 as compared to 4.1 (Table 8). The ratio between the total fertility rates and the total marital fertility rates produces an index of marriages (Cm) of 0.697 for Indonesia, 0.694 for Java-Bali, and 0.684 for outer Java-Bali (Table 7, second panel) showing that women in Java-Bali have higher proportion married and lower age at marriage than women who live in the Outer Java-Bali islands. The index of Cm for urban women is much lower than that for rural women (about 0.580 in the urban areas and 0.750 in the rural areas) reflecting the higher age at marriage of the urban women.

III.4. Postpartum Infecundability

After childbirth, a woman experiences temporary infecundability, that is a period when ovulation does not occur. This is called postpartum amenorrhea. In the absence of breastfeeding, the length of postpartum amenorrhea is usually one or two months after a childbirth. But this can be extended by intensive and prolonged breastfeeding. The length of postpartum infecundability is found to have a substantial effect on the level of fertility.

In this study, information on postpartum amenorrhea as well as postpartum abstinence is available. The duration of postpartum infecundability can be directly calculated from the mean duration of the postpartum insusceptible period. The mean duration of the postpartum insusceptible period is computed the same way as the mean duration of breastfeeding using the "prevalence/incidence" or "current status" method borrowed from epidemiology. (Ferry and Smith, 1983; NICPS Report page 17). Based on the information on the last live born child, the mean duration of postpartum insusceptibility is computed by dividing the number of women still amenorrheic or still abstaining at the time of the survey (the prevalence) by the monthly average number of births within 36 months before the survey (the incidence). In addition, mean duration of breastfeeding will also be calculated for the purpose of comparison with findings from the 1976 IFS. A model on the relation of breastfeeding and amenorrhea developed by Bongaarts will be applied to convert mean duration of breastfeeding to mean duration of postpartum infecundability.

The effect of breastfeeding on postpartum amenorrhea differs from one population to another. This can be due to differences in intensity and frequency of breastfeeding. In developing societies, the length of breastfeeding can be longer than one year. However, mothers also tend to give other supplementary food to their children. In other words, there are situations that mothers report very long durations of breastfeeding, but the children are not fully dependent on mothers' breastmilk. This is also the case with Indonesian women (Tables 9 and 10). Table 9 shows that in all of the regions, women breastfeed their babies for a period longer than one year. The longest duration of breastfeeding is found among rural women in Java-Bali, 29 months, while the urban Outer Java-Bali women breastfeed their babies only about 19 months. Even though the relation between the mean duration of breastfeeding and the calculated mean postpartum insusceptible periods from this survey are not consistent with the positive relations found by Bongaarts, the calculated index of postpartum

infecundability Ci is consistent with the patterns of breastfeeding. The index of Ci for Indonesia is 0.645. For Java-Bali it is 0.619, showing longer duration of postpartum infecundability due to longer duration of breastfeeding. For women living in the Outer Java-Bali, it is 0.723, consistent with the shorter duration of breastfeeding and amenorrhea (Table 15).

III.5. Contraceptive Use

The Indonesian family planning program has been considered as an example of an effective government innovation in a country without a high level of economic development, often considered as a necessary precursor to the successful family planning (Hull et al., 1977; Heiby et al., 1979; Freedman et al., 1981; McNicoll and Singarimbun, 1983; Ross and Poedjastuti, 1983 cited in Hugo et al., 1987, p. 151). The prevalence of contraceptive used increased very rapidly during the 15 years of the program. The 1980 population census recorded 26 percent of married women in Indonesia were using contraception (CBS, 1983, Series S No. 2, p. 130). This proportion increased to 38.5 percent in 1985 and increased further to 47.7 percent in 1987 (Table 11). The 1976 IFS recorded 26 percent of married women in Java-Bali using contraception, increased to 43 percent in 1985 and reached 51 percent in 1987. Great regional variation is found in these percentages, with the highest percentage use found among women in Java and Bali and the lowest use in LJB2. A consistent rise in the proportions of married women using contraception is found in all of the provinces.

Both the proportion of couples using contraception and the effectiveness of the methods used affect the level of fertility of the population. Prevalence of contraceptive use is defined as the proportion of currently married women using contraception at the time of the survey. The standard measure of contraceptive effectiveness (e) equals the proportional reduction in the monthly probability of conception due to the use of contraception among fecund women (Potter, 1960; Tietze, 1959 cited in Bongaarts and Potter 1983). In this study the prevalence of contraceptive use is computed by method used and by age of the women. The medium contraceptive effectiveness is taken from the U.N. Standard of Effectiveness, as shown in Table 12.

Before the 1987 NICPS there was no recent information available on contraceptive use effectiveness in Indonesia. The Indonesian Family Planning Coordinating Board, therefore, applies the U.N. Standard of Effectiveness to calculate the effect of contraceptive use. The 1987 NICPS provides useful information to estimate contraceptive use effectiveness based on failure rates (Molyneaux, et al., 1989). The comparison between the two rates however, shows a substantial difference, in which the NICPS rates are much higher. The calculation of the NICPS rate is based on the information of women using contraception for 0 to 23 months. The longer the period of observation, the more likely it is to have more women in the observation, but less accurate information. The shorter duration of observation will involve fewer women and the rates tend to be higher due to a selectivity bias. These rates are more likely to be revised downward. Both of these measures of use effectiveness will be applied to estimate an index of contraceptive used (Cc) to obtain an illustration of the impact of differences in effectiveness of fertility reduction.

The aggregate adjusted prevalence rate of contraception, i.e., percentage using contraception times use effectiveness, is very much affected by the variation of the method chosen. The method mix as well as the use effectiveness together will determine the level of the contribution of contraceptive used in reducing the level of fertility. In areas where women are more likely to use effective contraception like sterilization, implant, and IUD, they tend to have higher use effectiveness (Table 13).

The result of the calculation of the general use effectiveness (e) as well as the index of contraceptive use (Cc) are presented in Table 14. Almost half of the married women in Indonesia were using contraceptives at the time of the survey. The highest percentage was reached by women in Java-Bali, especially those living in urban areas (55 percent). Even though the idea of a small family size was introduced later to women in Outer Java-Bali, 41,4 percent were already using contraceptives. When applying the U.N. Standard of Use Effectiveness, the total effectiveness for each of the regions ranges from 0.848 in the urban Outer Java-Bali to 0.879 in the rural Java-Bali. It is surprising that contraceptive use effectiveness for rural women is higher than for the urban women. Does it imply that method mix is better in rural areas? Further, the index of contraceptive used estimated (Cc) is around 0.493 to 0.617. The lowest index (showing high percentage of use) is found in the urban areas of Java-Bali, while the highest is in rural Outer Java-Bali. These findings tend to be consistent to the stages of the implementation of the family planning program in Indonesia. Except for Outer Java-Bali urban,

this calculation results in an estimated Total Fecundity Rate (TF) of about 12.3 to 15. The highest fecundity was reached by urban women in Java-Bali, 14.9. The estimated TF for women in urban areas of the Outer Java-Bali (19.8), is beyond the expected TF of between 13 - 17 for a natural fertility population (Bongaarts and Potter, 1983), but this estimate might have suffered from errors due to the small sample.

If the 1987 NICPS use effectiveness rate were to be applied, then the total effectiveness will range from around 0.934 to 0.957, a very high rate compared to those experienced by other developing countries. These rates result in an estimated index of contraceptive used (Cc) ranging from 0.441 to 0.558. Applying the same index of marriage and postpartum infecundability (Cm and Ci), the total fecundity estimated is around 13 to 17 (except for LJB2). Again the TF for LJB2, which is 20.2, might have suffered from errors due to the small sample. The calculation of Cc using the U.N. Standard of Effectiveness tends to reduce fertility by 33 percent for Java-Bali, 38 percent for urban, and 31 percent for rural areas. While the use of 1987 NICPS results reduces fertility by 38.5 for Java-Bali, with 37 percent in the urban and 44.5 percent in the rural areas. In other words, 8.8 percent increase in effectiveness can reduce the index of Cc 31 by 7.8 percent and increase in TF by 7.5 percent which in turn will increase the contribution of contraceptive use to reduce fertility reduction by 6.5 percent (Table 14).

III.6. Total Fecundity and Natural Marital Fertility

Tables 15 and 16 show the results of the calculation of the index of proportion married (Cm), index of contraceptive used (Cc) and the index of postpartum infecundability (Ci). In this section the last index of proximate determinants will be discussed, i.e., the index of total fecundity (TF). The index of total fecundity (TF) is measured from the Total Fertility Rate divided by the product of the estimated three proximate determinants (i.e. Cm*Cc*Ci). If in a population all women married early and if breastfeeding and postpartum amenorrhea, contraception and induced abortion were not practiced, then total fecundity is the expected number of children the women will have during their reproductive life span. In the absence of breastfeeding and postpartum abstinence, the duration of postpartum infecundability is short, 1.5 to 2 months on the average (Bongaarts and Potter, 1983). Hence, the interval between births is also shorter. If the average natural waiting time to conception is 7.5 months and an additional 2 months for infecundability after an intrauterine mortality, plus 9 months full gestation period, theoretically a woman could bear 15 children on the average within her 25 years of reproductive life (25/1.5 + 7.5 + 2.0 + 9.0). The range of TF is about 13 to 17 children on the average (Bongaarts and Potter, 1983).

If practices of breastfeeding and postpartum abstinence exist, the level of total fecundity will drop to the level of Natural Marital fertility (TN). The difference between the level of TF and TN shows the effect of breastfeeding and postpartum amenorrhea on fertility. The estimated TF and TN from the 1987 NICPS are also shown in Tables 15 and 16. Based on the U.N. Standard of Use Effectiveness, the estimated TF is around 12 to 15 (except for urban Outer Java-Bali). As expected, urban women are more fecund than rural women. But all Java-Bali women are in general less fecund than women from Outer Java-Bali, LJB1 or LJB2 (13.1 as compared to 14.2 or 14.7). Is this an answer of an old issue developed from the finding of the 1973 Fertility Mortality Survey, in which women in Sumatra married later but have a higher level of fertility than women in Java who married earlier but have lower fertility (McDonald, et al., 1976)? Might it be that women in Sumatra in fact have higher fecundity? Further detailed examination on marriage and reproductive behavior is needed to answer this question. If the practice of breastfeeding and postpartum abstinence is taken into account, married women are expected to have 8 to 11 children (estimated TN in Tables 15 and 16 except for urban Outer Java-Bali women). This is the number of children that women normally have under conditions of natural fertility. These figures conform to a situation before 1971, when women in North Sumatra had total marital fertility rate of about 9 (TFR 7.2); Lampung, 8 (TFR 6.35); West Java 7.5 (TFR 5.95), East Java 6 (TFR 4.7) and North Sulawesi 7.9 (TFR 6.8) (TFR figures are taken from Central Bureau of Statistics, 1983).

III.7. Summary Measures of the Fertility Inhibition Effects of the Proximate Determinants

Table 17 shows a summary of effects of proximate determinants on the actual level of fertility. The effect of breastfeeding and post partum abstinence suppressed the level of the total fecundity (TF) to the level

of total natural fertility (TN) which is about 24 to 38 percent lower. The highest percentage difference between TF was TN was experienced by the Java-Bali women, thereby reflecting a longer duration of breastfeeding. This shows that breastfeeding practices have a substantial effect on suppressing fertility. The effect of contraceptive used and its effectiveness, further suppressed the level of natural fertility TN to the level of total marital fertility TM of about 38 percent in Outer Java-Bali, and 52 percent in urban areas of Java-Bali. The effect of postponement of marriage to suppress the level of TM to the level of TFR varies widely from 25 to 45 percent. The effects are strongest among urban women because they usually marry later than women in the rural areas. If all of the proximate determinants work simultaneously then, they can suppresse the level of Total Fecundity to the actual level of fertility (from TF to TFR) of about 70 to 80 percent, that is from 12 to 15 to the actual level of TFR 2.6 to 4.6.

IV. Trends in the Proximate Determinants of Fertility in Java-Bali and Decomposition of the Change in Fertility Rate

In this section results of the calculation of indexes of proximate determinants from the 1987 NICPS will be compared to those calculated from the 1976 Indonesia Fertility Survey done by Casterline et al. (1984). Contributions of each of the proximate determinants to fertility decline will be examined using decomposition method of the change in fertility (Tables 18 to 21). Since the 1976 IFS only covered Java-Bali area, examination of trends in proximate determinants will also be limited to Java-Bali.

IV.1. Trends of the Proximate Determinants

Figures in Table 18 show that during the period of 11 years, the proportion of married women using contraceptives has increased from 23 percent in 1976 to 51 percent in 1987. With overall use effectiveness fairly constant, the estimated index of contraceptive use declined substantially from 0.771 in 1976 to 0.518 in 1987. Contrary to our expectations, the mean duration of breastfeeding has gone up from 23 months to 27 months, a finding which is consistent with the results of the 1983 Contraceptive Prevalence Survey (Joesoef et al., 1989). The duration of breastfeeding among women in Jakarta increased from 14.4 months in 1976 to 19.9 months in 1983, an increase of 5 months. Joesoef, et al. believed that "this increase is not an artifact of a reporting bias, but a true reflection of a change in breastfeeding." They suggested that fertility reduction might have prolonged the duration of breastfeeding, since mothers who were breastfeeding might have weaned their child when they were pregnant. Another possibility is that inasmuch as mothers cease breastfeeding if the child dies, with declining infant mortality longer durations of breastfeeding would be expected. Due to the unavailability of information on period of postpartum amenorrhea and abstinence in the 1976 Indonesia Fertility Survey, for the purpose of comparison postpartum infecundability was estimated using Bongaarts' model defined in equation 6, section 4. The estimated mean duration of postpartum infecundability increased from 16.1 to 19.6 months, which in turn decreased the index of postpartum infecundability from 0.578 in 1976 to 0.525 in 1987. The decreasing proportion of married among women in Java-Bali, as a reflection of increasing age at age at marriage, has caused the index of proportion married to decline from 0.753 in 1976 to 0.694 in 1987. The total fecundity rates, that is Total Fertility Rates divided by the product of index of proportion married, index of contraception and index of postpartum infecundability, increased from 13.4 in 1976 to 15.5 in 1987. This implied that if women were married early, did not use contraception or practice induced abortion, and did not breastfeed at all, then in 1976 they would have expected to bear 13.4 children; this number increased to 15.5 children in 1987. The increase in the total fecundity rate of women in Java-Bali might be due to declining spontaneous abortion because of better health care. Fecundity impairment due to infections after miscarriages might be decreasing, thereby lengthening the duration of their fertile period. Another reason might be due to changing patterns of marriage (Hull and Adioetomo, 1985), that is the declining prevalence of arranged and early marriage which lead to elimination of unconsummation of first marriage as found in some villages in rural Central Java by Hull (1976).

If breastfeeding and induced abortion were practiced, then the number of children expected to be born by a woman (TN) is about 8 children. The difference of TN between 1976 and 1987 is very slight (7.8 as compared to 8.1). Does this imply a compensating effect between decreasing intrauterine mortality caused by better health care and the tendency of increasing induced abortion?

In 1976, the marriage patterns suppressed natural marital fertility from 8 to about 6 children. In 1987 the total marital fertility rate declined to 4.2 as a reflection of a reduction in the proportion married. The actual level of fertility of women in Java-Bali declined 35 percent, that is from 4.5 in 1976 to 2.9 in 1987.

IV.2. Decomposition of the Change in the Java-Bali Fertility Rate 1976-1987

Using equation 8 from section 4, the contribution of each of the proximate determinants to the fertility decline can be calculated. Figures in Table 19 show that the changing proportion of married of women in Java-Bali has contributed about 8 percent decline in fertility. The rapid increase of contraceptive practice has contributed about 33 percent decline. The role of increasing duration of postpartum infecundability has led to 9 percent of fertility decline and the interaction contributed an estimated 0.5 percent decline. Working simultaneously this would have led to fertility decline of 50 percent. However, the increase in total fecundity of 13.4 in 1976 to 15.5 in 1987, resulted in a potential increase of fertility of about 15 percent. As a result of these factors, fertility declined by 35 percent.

IV.3. Trends in Proximate Determinants and the Decomposition of Fertility Change by Residence

The changes of the proximate determinants during 1976 and 1987 are also seen both in the urban as well as in the rural areas of Java-Bali. However, the patterns of contribution of each of the proximate determinants is different. The urban women achieved higher fertility decline than women from the rural areas, 39 percent as compared to 33 percent (Table 21). The results of the decomposition of the change are also different. The contribution of contraceptive use is high for both of the areas (39 percent as compared to 31 percent), but the contribution of the proportion married in the rural areas is very small (11 percent as compared to 4 percent). It implies that increasing age at marriage in the rural areas is still to be promoted. On the contrary, rural women in Java-Bali achieved a higher reduction in fertility due to longer duration of postpartum infecundability, 24 percent decline as compared to 16 percent in urban areas.

Although it is very obvious that longer duration of breastfeeding induced substantial level of fertility decline, the policy implication from this finding should be drawn very cautiously. Longer duration of breastfeeding might delay the return of ovulation and prevent mothers from becoming pregnant for a longer period of time. However, breastfeeding duration of longer than one year will result in a low quality of breastmilk, although it is enough to satisfy hunger. It also tends to lessen the appetite for solid foods. This can lead to a hazardous life for the child due to low nutrition and poor health status.

V. CONCLUSION

In this study the application of Bongaarts' method on estimation of proximate determinants of fertility was hampered by several problems. First, there were difficulties in measuring an index of proportion married due to the unavailability of marriage history. Second, the application of 75 percent of the 20-24 marital fertility rate to estimate the rate for women aged 15-19 years as a solution of inaccurate rate of that age seems rather arbitrary (section 5.3). The calculation from the two measurements of ASMFR 15-19 produce a substantial difference in TF (Table 8). Further, measures of use effectiveness of contraception are normally not available in most countries. Different use effectiveness (U.N. medium) has to be applied assuming the same pattern as those found in Indonesia. Results of these calculations, therefore, need to be interpreted cautiously.

Despite all the problems mentioned above, however, patterns of the results of estimation of the proximate determinants and the decomposition of its changes tend to be still applicable to the Indonesian situation. The contribution to fertility decline by changes in index of contraception is robust in the sense that it is not affected by changes in other proximate determinants. This confirms a high contribution of contraceptive use to the decline of fertility in Java-Bali. In a more detailed description, if proportion married, contraceptive used, and postpartum infecundability work simultaneously they would have reduced fertility about 50 percent (as stated earlier); hence the role of contraceptive use to fertility decline in Java-Bali is about 65 percent (32.7 percent out of 50.35). The role of contraceptive use in urban areas is higher than that in rural areas, 54 percent as compared to 46.5 percent. The percentage use of traditional methods and condoms is low in Java-Bali, 2.8 of traditional methods and 2 percent use of condoms (Table 13). As high as 80 percent of users obtained their

supplies from family planning clinics, hospitals and health centers - family planning field workers, family planning post (pos KB), or integrated service post (posyandu) (DHS Report, Table 4.5). These suggest that most of the contribution of contraceptive use to fertility decline is attributable to family planning program effort. This supports the argument stated in the first paragraph in section 5.5 that a family planning program can be very successfully implemented in a country prior to high rates of development, provided that the government makes a strong commitment to the effort. It is obvious that the family planning program has contributed a great deal to the fertility decline in Indonesia.

It should be noted that this study has used Bongaarts' model of proximate determinants of fertility. As stated earlier, proximate determinants of fertility are a set of biological and behavioral factors through which socio-economic and environmental factors affect fertility. In this study socio-economic and environmental variables have not been explored, except the urban rural variables.

Policy implications that can be drawn from this study in order to achieve further fertility decline are: 1) campaigning for further increase in age at marriage of women, especially in the rural areas, 2) encouraging efforts to increase the quality of use of contraception to induce higher use effectiveness that will lead to greater contribution to the fertility decline, and 3) providing more information to women about costs and benefits of longer duration of breastfeeding, encouraging full and intensive breastfeeding, and also encouraging breastfeeding for less than 2 years, especially in rural areas.

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TABLE 1: AGE SPECIFIC FERTILITY RATE AND TOTAL FERTILITY RATE FOR FIVE YEARS BEFORE THE SURVEY (1983-1987)

AGE OF WOMEN	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
15 - 19	0.074	0.064	0.102	0.102	0.102
20 - 24	0.187	0.165	0.234	0.225	0.271
25 - 29	0.172	0.149	0.217	0.215	0.223
30 - 34	0.128	0.110	0.163	0.166	0.151
35 - 39	0.073	0.065	0.089	0.085	0.104
40 - 44	0.031	0.024	0.046	0.045	0.046
45 - 49	0.010	0.007	0.016	0.018	0.010
TFR	3.374	2.923	4.328	4.277	4.528

Source: Lembaga Demografi,1989; estimated from the 1987 NICPS/DHS

TABLE 1A: AGE SPECIFIC FERTILITY RATE AND TOTAL FERTILITY RATE FOR FIVE YEARS BEFORE THE SURVEY (1983 - 1987)

AGE OF WOMEN	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
15 - 19	0.041	0.095	0.039	0.084	0.051	0.120
20 - 24	0.148	0.207	0.136	0.183	0.188	0.250
25 - 29	0.170	0.172	0.152	0.147	0.218	0.215
30 - 34	0.123	0.130	0.117	0.106	0.139	0.169
35 - 39	0.058	0.079	0.055	0.069	0.065	0.096
40 - 44	0.023	0.035	0.021	0.026	0.030	0.049
45 - 49	0.004	0.012	0.002	0.009	0.009	0.016
TFR	2.837	3.651	2.604	3.125	3.500	4.566

Source: Lembaga Demografi,1989; estimated from 1987 NICPS/DHS

TABLE 2: PROPORTIONS OF WOMEN IN INDONESIA NEVER MARRIED

AGE	1980	1985	1987
15-19	70.0	82.1	81.0
20-24	22.3	29.7	34.8
25-29	7.4	8.9	10.5
30-34	3.4	4.1	4.1
35-39	1.9	2.5	3.0
40-44	1.4	1.7	1.1
45-49	1.2	1.4	1.4

Source: 1987 NICPS/DHS Report table 2.2.

TABLE 3: MEAN AGE AT MARRIAGE FOR JAVA-BALI WOMEN

RESIDENCE	MEAN AGE AT FIRST MARRIAGE FOR WOMEN AGED 25+					
	1976 IFS			1987 NICPS		
	<35 YRS	35+	TOTAL	<35 YRS	35+	TOTAL
JAVA-BALI	15.6	15.3	15.3	18.1	17.6	17.9
n	2838	3484	6322	3362	3317	6679
URBAN	17.1	16.3	16.6	19.2	18.7	19.0
n	444	551	995	1332	1285	2617
RURAL	15.3	14.9	15.1	17.4	16.9	17.1
n	2394	2933	5327	2030	2032	4062

Source: CBS: THE 1976 IFS Principal Report Vol II (page 40)
Estimated from the 1987 NICPS/DHS

TABLE 4: MEDIAN AGE AT FIRST BIRTH

AGE OF WOMEN	Java-Bali 1976 IFS	Java-Bali 1987 NICPS	Indonesia 1976 IFS	Indonesia 1987 NICPS
25-29	19.5	19.9	-	20.2
45-49	19.4	19.8	-	19.8

Source:
1976 IFS Report Vol. II
1987 NICPS/DHS Report table 6.7

TABLE 5: PERCENT OF MARRIED WOMEN TO TOTAL WOMEN SUPAS 1985 (ONLY FOR AREAS COVERED BY THE 1987 NICPS)

AGE OF WOMEN	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
15 - 19	18	20	12	12	14
20 - 24	66	68	63	62	66
25 - 29	86	86	85	85	88
30 - 34	90	89	90	90	89
35 - 39	89	89	88	88	89
40 - 44	84	84	85	85	84
45 - 49	77	77	78	85	76

Source: CBS: 1985 SUPAS

TABLE: 5A: PERCENT OF MARRIED WOMEN TO TOTAL WOMEN SUPAS 1985 (ONLY FOR AREAS COVERED BY THE 1987 NICPS)

AGE OF WOMEN	INDONESIA URBAN	INDONESIA RURAL	JAVA-BALI URBAN	JAVA-BALI RURAL	OUTER JAVA-BALI URBAN	OUTER JAVA-BALI RURAL
15 - 19	9	22	9	27	7	14
20 - 24	50	74	52	77	46	68
25 - 29	78	89	78	90	77	88
30 - 34	86	91	85	91	89	90
35 - 39	86	90	86	90	87	88
40 - 44	80	86	79	86	84	86
45 - 49	75	77	75	77	76	78

Source: CBS: 1985 SUPAS

TABLE 6:
PERCENTAGE DISTRIBUTIONS OF EVER MARRIED WOMEN
AGED 15 - 19 YEARS, 1987 NICPS

AGE	INDONESIA			JAVA-BALI			OUTER
	URBAN	RURAL	TOTAL	URBAN	RURAL	TOTAL	JAVA-BALI
15	3	4	4	2	3	3	9
16	3	8	7	3	9	7	5
17	15	18	18	17	19	18	16
18	36	37	37	37	35	35	40
19	43	32	34	41	35	36	32

Source: Lembaga Demografi, 1989; estimated from the 1987 NICPS

TABLE 7A: ASMFR (15-19) AND TMFR AS ESTIMATED FROM 1987 NICPS

	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
ASFR 15 - 19	0.422	0.320	0.825	0.836	0.751
TMFR	5.889	4.895	9.046	9.037	8.841
Cm	0.573	0.597	0.478	0.473	0.512
Tf	14.794	15.251	20.251	21.419	19.898

	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
ASFR 15 - 19	0.482	0.433	0.429	0.315	0.770	0.970
TMFR	6.192	5.965	5.585	4.765	8.732	9.980
Cm	0.458	0.612	0.467	0.656	0.405	0.458
Tf	18.275	16.497	18.752	14.357	26.947	20.637

TABLE 7B: ASMFR(15-19) BASED ON 75 % OF ASMFR(20-24) AND THE TMFR

	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
ASFR 15 - 19	0.202	0.183	0.240	0.271	0.308
TMFR	4.838	4.210	6.325	6.217	6.629
Cm	0.697	0.694	0.684	0.688	0.683
TF	13.61	13.116	14.188	14.73	14.911

	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
ASFR 15 - 19	0.208	0.205	0.198	0.179	0.214	0.253
TMFR	4.888	4.848	4.430	4.086	6.422	6.626
Cm	0.580	0.753	0.588	0.765	0.545	0.689
Tf	16.072	12.526	14.874	12.311	19.818	13.703

TABLE 8: ASFR AND TMFR FOR FIVE YEARS BEFORE THE SURVEY (1983-1987) (BASED ON THE 1985 PROPORTION MARRIED)

AGE OF WOMEN	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
15 - 19	0.212	0.183	0.281	0.272	0.308
20 - 24	0.282	0.244	0.374	0.362	0.411
25 - 29	0.200	0.173	0.254	0.254	0.253
30 - 34	0.142	0.123	0.181	0.184	0.170
35 - 39	0.082	0.073	0.101	0.096	0.117
40 - 44	0.037	0.028	0.053	0.053	0.054
45 - 49	0.013	0.018	0.021	0.023	0.013
TMFR	4.838	4.210	6.325	6.217	6.629

Note: ASMFR (15-19) is estimated as 75% of ASMFR(20-24)

AGE OF WOMEN	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
15 - 19	0.221	0.210	0.198	0.179	0.308	0.300
20 - 24	0.295	0.280	0.264	0.239	0.410	0.400
25 - 29	0.218	0.194	0.195	0.164	0.285	0.252
30 - 34	0.143	0.142	0.137	0.116	0.157	0.188
35 - 39	0.067	0.089	0.064	0.077	0.075	0.109
40 - 44	0.029	0.040	0.026	0.030	0.036	0.058
45 - 49	0.005	0.016	0.002	0.012	0.013	0.020
TMFR	4.888	4.848	4.430	4.086	6.422	6.626

Notes: ASMFR (15-19) is estimated from 75% times ASMFR (20-24).
Source: Lembaga Demografi, 1989, estimated from the 1987 NICPS/DHS

TABLE 9: MEAN DURATION OF BREASTFEEDING AND INSUSCEPTIBLE PERIOD, 1987 NICPS

REGION	STILL BREASTFEEDING	STILL INSUSCEPTIBLE
Indonesia	25.7	12.5
Urban	21.9	10.6
Rural	27.1	13.2
Java-Bali	27.4	13.8
Urban	23.0	13.8
Rural	29.4	13.7
Outer Java-Bali	23.3	9.2
Urban	19.6	14.2
Rural	24.3	7.9
LJB 1	26.5	10.6
LJB 2	21.3	10.1

Source: NICPS/DHS Report and LDFEUI, 1989

TABLE 10: PERCENT RESPONDENTS GIVING FOOD OTHER THAN BREASTMILK TO THEIR CHILD, INDONESIA, 1987 NICPS

KIND OF FOOD	YES	NO	TOTAL
Powder or in Milk	22.3	77.9	100.0 2183
Juice/Tea/ Soup	52.8	47.2	100.0 2183
Rice/Bread/ Biscuit	78.2	21.8	100.0 2183
Fruit/ Vegetables	73.8	26.2	100.0 2183
Egg/Fish/ Meat	55.9	44.1	100.0 2183
Other Liquid Solid	52.8	47.2	100.0 2183
Plain Water	72.79	27.2	100 2183

Source: Lembaga Demografi from 1987 NICPS

TABLE 11: PERCENT MARRIED WOMEN USING CONTRACEPTION

REGION	1976 (IFS)	1985 (SUPAS)	1987 (NICPS)
INDONESIA	-	38.5	47.7
JAVA-BALI	26.0	43.0	51.0
JAKARTA	28.0	45.0	54.0
WEST JAVA	16.0	45.1	46.0
CENTRAL JAVA	28.0	40.0	54.0
YOGYAKARTA	40.0	55.0	68.0
EAST JAVA	32.0	41.0	50.0
BALI	38.0	63.0	69.0
LJB1	-	31.0	42.0
LJB2	-	26.0	40.0

TABLE 12: CONTRACEPTIVE EFFECTIVENESS (EM)

METHOD	1987 NICPS	U.N. MEDIUM	USED IN 1976
Sterilization	1.00	1.00	1.00
Pill	0.93	0.87	0.90
IUD	0.97	0.90	0.95
Injection	0.98	0.87	0.70
Condom	0.95	0.75	0.70
Implant	0.95	0.95	-
Traditional	0.87	0.70	0.70

Notes: (1) Molyneaux, et al (1989)
(2) U.N.
(3) Laing, 1975 in Casterline, 1984

TABLE 13: PERCENTAGE MARRIED WOMEN USING CONTRACEPTION BY METHOD 1987 NICPS

REGION	PILL	IUD	INJEC	CONDOM	STER	IMPLANT	OTHER	TOTAL
Indonesia	16.1	13.2	9.4	1.6	3.3	0.4	3.7	47.7
Urban	12.6	12.9	11.8	4.2	5.9	0.7	6.2	54.3
Rural	17.4	13.3	8.4	0.6	2.1	0.5	3.0	45.3
Java-Bali	16.0	15.5	10.7	1.8	3.7	0.4	2.8	50.9
Urban	13.2	13.8	12.8	4.2	6.3	0.2	4.7	55.2
Rural	17.3	16.3	9.8	0.7	2.5	0.5	1.8	48.9
Outer JBL	16.1	8.6	6.7	1.1	2.5	0.4	6.0	41.4
Urban	10.6	10.3	8.9	3.9	6.0	0.8	10.7	51.2
Rural	17.5	8.2	6.1	0.4	1.5	0.2	4.8	38.7
LJB1	16.2	8.7	6.6	1.1	2.6	0.5	6.0	41.7
LJB2	15.3	8.4	7.1	1.4	1.6	0.0	5.8	39.6

Source: NICPS/DHS Report; Lembaga Demografi,1989

TABLE 14: PERCENT OF CONTRACEPTIVE USE, CONTRACEPTIVE EFFECTIVENESS (e) AND THE INDEX OF CONTRACEPTION

	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
PERCENT USE	47.7	50.9	41.4	41.7	39.6
UN MEDIUM(e)	0.870	0.876	0.857	0.858	0.853
Cc	0.551	0.518	0.617	0.614	0.635
Tf	13.641	13.116	14.188	14.728	14.911
CONTRIBUTION TO FERTILITY DECLINE (%)	-	32.77			
'87 NICPS					
EFFECTIVENESS	0.954	0.957	0.943	0.946	0.934
Cc	0.508	0.474	0.578	0.588	0.545
Tf	14.79	14.344	15.757	13.74	20.177
CONTRIBUTION TO FERTILITY DECLINE (%)	-	38.52			

	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
PERCENT USE	54.3	45.3	55.3	49.0	51.5	38.8
UN MEDIUM(e)	0.864	0.873	0.869	0.879	0.848	0.86
Cc	0.493	0.573	0.481	0.535	0.529	0.639
Tf	16.072	12.526	14.874	12.311	19.818	13.703
CONTRIBUTION TO FERTILITY DECLINE (%)	-	-	38.88	30.61		
'87 NICPS						
EFFECTIVENESS	0.954	0.952	0.957	0.957	0.944	0.942
Cc	0.441	0.535	0.428	0.494	0.475	0.604
Tf	17.346	13.753	16.716	13.333	17.648	16.185
CONTRIBUTION TO FERTILITY DECLINE (%)	-	-	37.23	44.49		

Source:Lembaga Demografi 1989 from 1987 NICPS

TABLE 15: ESTIMATES OF FERTILITY MEASURES, PROXIMATE DETERMINANTS AND INDEXES OF PROXIMATE DETERMINANTS FOR INDONESIA, JAVA-BALI, AND OUTER JAVA-BALI (NICPS87)

	Indonesia	Java-Bali	Outer Java-Bali	LJB1	LJB2
Total Fertility Rate (TFR)	3.374	2.920	4.327	4.276	4.528
Total Marital Fertility Rate (TMFR)	4.838	4.210	6.325	6.215	6.625
Proportion Currently Using Contraception (u)	0.477	0.509	0.414	0.417	0.396
Contraceptive Use Effectiveness (e)	0.870	0.876	0.857	0.858	0.853
Total Abortion Rate (TA)	-	-	-		
Mean Duration of Breastfeeding	25.7	27.3	23.4	26.5	21.3
Duration of Postpartum Infecundability (i)	12.5	13.8	9.2	10.6	10.1
Index of Marriage (Cm)	0.697	0.694	0.684	0.688	0.683
Index of Contraception (Cc)	0.551	0.518	0.617	0.614	0.635
Index of Induced Abortion (Ca)		-			
Index of Postpartum Infecundability (Ci)	0.645	0.619	0.723	0.687	0.699
Total Fecundity Rate (Tf)	13.610	13.116	14.188	14.730	14.911
Total Natural Marital Fertility TN (Ci*Tf)	8.780	8.122	10.251	10.123	10.427
Expected Birth From TN	8	8	11	10	10

Source: Lembaga Demografi, 1989
i is the postpartum insusceptible period derived from the 1987 NICPS.

TABLE 16: ESTIMATES OF FERTILITY MEASURES, PROXIMATE DETERMINANTS AND INDEXES OF PROXIMATE DETERMINANTS FOR URBAN AND RURAL AREAS OF INDONESIA, JAVA-BALI AND OUTER JAVA-BALI, NICPS 87

	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Total Fertility Rate (TFR)	2.839	3.651	2.609	3.125	3.536	4.567
Total Marital Fertility Rate (TMFR)	4.888	4.848	4.430	4.086	6.422	6.626
Proportion Currently Using Contraception (u)	0.543	0.453	0.553	0.490	0.515	0.388
Contraceptive Use Effectiveness (e)	0.864	0.873	0.869	0.879	0.848	0.860
Total Abortion Rate (TA)	-	-	-	-	-	-
Mean Duration of Breastfeeding	21.900	27.100	22.900	29.400	19.580	24.310
Duration of Postpartum Infecundability (i)	13.920	11.110	13.800	13.740	14.150	7.930
Index of Marriage (Cm)	0.581	0.753	0.589	0.765	0.551	0.689
Index of Contraception (Cc)	0.493	0.573	0.481	0.535	0.529	0.639
Index of Induced Abortion (Ca)	-	-	-	-	-	-
Index of Postpartum Infecundability (Ci)	0.617	0.675	0.619	0.620	0.613	0.757
Total Fecundity Rate (Tf)	16.072	12.526	14.874	12.311	19.818	13.703
Total Natural Marital Fertility TN (Ci*Tf)	9.915	8.461	9.210	7.637	12.140	10.369
Expected Birth From TN	10	9	9	8	10	11

Source: Lembaga Demografi, 1989
i is the postpartum insusceptible period derived from the 1987 NICPS

TABLE 17: SUMMARY OF FERTILITY INHIBITING EFFECTS OF THE PROXIMATE DETERMINANTS FOR MAJOR REGIONS OF INDONESIA, 1987 NICPS

	INDONESIA	JAVA-BALI	OUTER JAVA-BALI	LJB1	LJB2
Fertility Measures					
TF	13.6	13.1	14.2	14.7	14.9
TN	8.8	8.1	10.2	10.1	10.4
TM	4.8	4.2	6.3	6.2	6.6
TFR	3.4	2.9	4.3	4.3	4.5
% Effect of Ci (TF to TN)	35.2	38.2	28.2	31.3	30.2
% Effect of Cc (TN to TM)	45.4	48.1	38.2	38.6	36.5
% Effect of Cm (TM to TFR)	29.2	30.9	31.7	30.6	31.8
Combined effects of Ci,Cc,Cm on	75.0	77.9	69.7	70.7	69.8

	INDONESIA		JAVA-BALI		OUTER JAVA-BALI	
	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Fertility Measures						
TF	16.1	12.5	14.8	12.3	19.8	13.7
TN	9.9	8.7	9.2	7.6	12.1	10.4
TM	4.9	4.8	4.4	4.1	6.4	6.3
TFR	2.8	3.6	2.6	3.1	3.5	4.6
% Effect of Ci (TF to TN)	38.5	30.4	37.8	38.2	38.9	24.1
% Effect of Cc (TN to TM)	50.6	31.2	52.2	46.1	47.1	39.4
% Effect of Cm (TM to TFR)	42.7	25.8	40.9	24.4	45.3	27.0
Combined effects of Ci,Cc,Cm on	82.6	71.2	82.4	74.8	82.3	66.4

Source: Lembaga Demografi, 1989 from 1987 NICPS

TABLE 18: ESTIMATES OF FERTILITY MEASURES, PROXIMATE DETERMINANTS, AND INDEXES OF PROXIMATE DETERMINANTS FOR JAVA-BALI 1976 AND 1987

	72-76 WFS 76	83-87 NICPS 87
Total Fertility Rate (TFR)	4.513	2.920
Total Marital Fertility Rate (TMFR)	5.993	4.210
Proportion Currently Using Contraceprtion (u)	0.230	0.509
Contraceptive Use Effectiveness (e)	0.874	0.876
Total Abortion Rate (TA)	-	-
Mean Duration of Breastfeeding	23.0	27.4
Duration of Postpartum Infecundability (i)	16.1	19.6
Index of Marriage (Cm)	0.753	0.694
Index of Contraception (Cc)	0.771	0.518
Index of Induced Abortion (Ca)	-	-
Index of Postpartum Infecundability (Ci)	0.578	0.525
Total Fecundity Rate (Tf)	13.448	15.472
Total natural marital Fertility TN (Ci*Tf)	7.774	8.122
Expected birth from TN	8	8

Notes:
i = 1.753 exp (0.1396b - 0.001872b2)

TABLE 19: DECOMPOSITION OF THE CHANGE IN THE JAVA-BALI FERTILITY RATE 1976-1987

Factors Responsible for Fertility Change	Percent of change in TFR	Distrib'n of change in TFR	Absolute change in TFR
Proportion of women married	-7.89	-22.35	-0.36
Contraceptive Practice	-32.77	-92.82	-1.48
Practice of Induced Abortion	-	-	
Duration of Postpartum Infecundability	-9.19	-26.02	-0.41
Other Proximate Determinants	15.05	42.63	0.68
Interaction	-0.50	-1.42	-0.02
TOTAL	-35.30	100.00	1.59

Source: Lembaga Demografi, 1989.

TABLE 20: ESTIMATES OF FERTILITY MEASURES, PROXIMATE DETERMINANTS AND INDEXES OF PROXIMATE DETERMINANTS FOR JAVA-BALI 1976 AND 1987 URBAN AND RURAL AREAS

	72-76 WFS 76 URBAN	83-87 NICPS 87 URBAN	72-76 WFS 76 RURAL	83-87 NICPS 87 RURAL
Total Fertility Rate (TFR)	4.303	2.609	4.669	3.125
Total Marital Fertility Rate (TMFR)	6.530	4.430	5.858	4.086
Proportion Currently Using Contraceprtion (u)	0.243	0.553	0.226	0.490
Contraceptive Use Effectiveness (e)	0.812	0.869	0.884	0.879
Total Abortion Rate (TA)	-	-	-	-
Mean Duration of Breastfeeding	16.5	22.9	27.9	29.4
Duration of Postpartum Infecundability (i)	10.5	16.1	11.4	21.1
Index of Marriage (Cm)	0.659	0.589	0.797	0.765
Index of Contraception (Cc)	0.787	0.481	0.771	0.535
Index of Induced Abortion (Ca)	-	-	-	-
Index of Postpartum Infecundability (Ci)	0.689	0.578	0.668	0.505
Total Fecundity Rate (Tf)	12.047	15.945	11.377	15.109
Total Natural Marital Fertility TN (Ci*Tf)	8.297	9.210	7.598	7.637
Expected Birth From TN	8	9	8	8

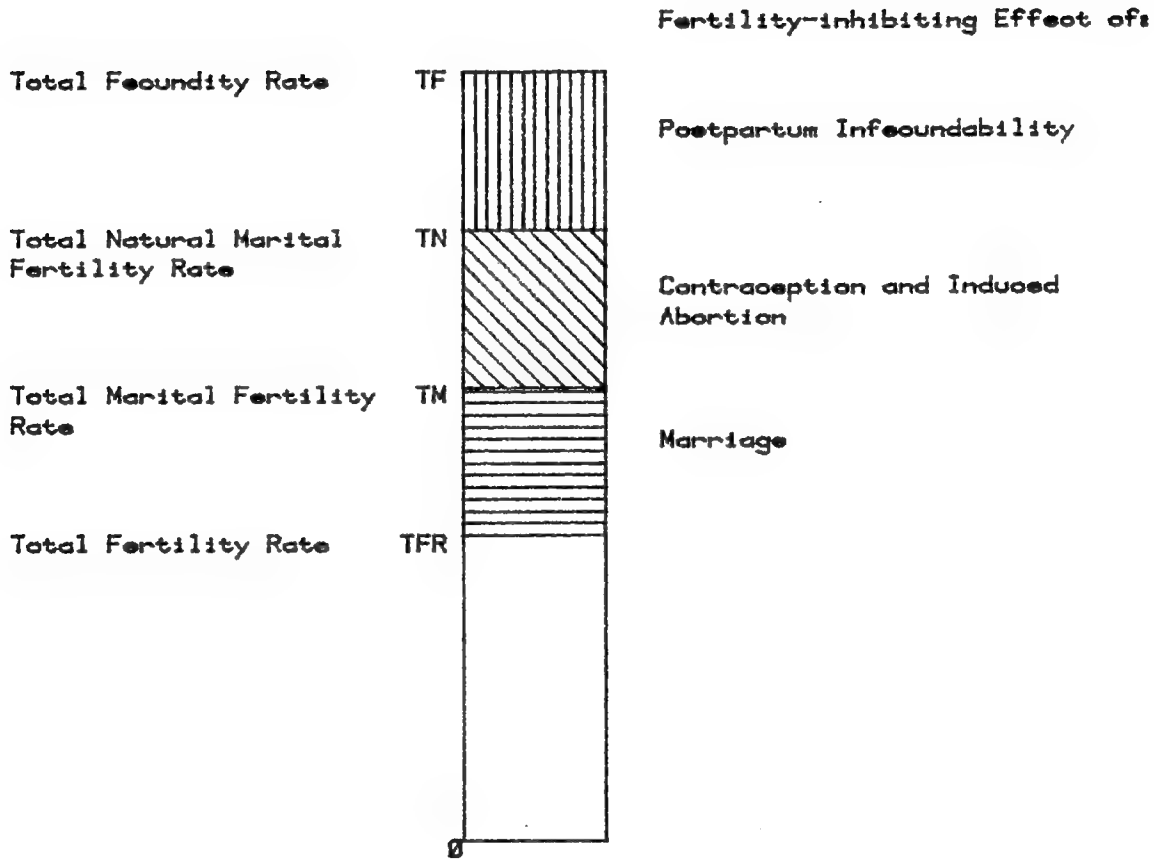
Note: duration of postpartum infecundability is estimated based on the mean duration of breastfeeding using equation: i = 1.753 exp (0.1396b - 0.001872b2)

TABLE 21: DECOMPOSITION OF CHANGE IN JAVA-BALI FERTILITY 1976-1987

Factors Responsible for Fertility Change	Urban TFR			Rural TFR		
	% Change	Distribution of Change	Absolute Change	% Change	Distribution of Change	Absolute Change
Proportion of women married	-10.63	-27.86	-0.46	-4.04	-12.21	-0.19
Contraceptive Practice	-38.88	-1-1.89	-1.67	-30.61	-92.56	-1.43
Induced Abortion	-	-	-	-	-	-
Duration of Postpartum Infecundability	-16.13	-42.28	-0.69	-24.32	-73.53	-1.13
Other Proximate Determinants	32.36	84.80	1.39	32.81	99.21	1.53
Interaction	-6.08	-15.94	-0.26	-6.91	-20.91	-0.32
Total	-39.37	100.00	1.69	-33.07	100.00	1.54

Source: Lembaga Demografi, 1989

Figure 1. Relationships between the Fertility-Inhibition effects of Proximate Variables and Various measures of Fertility



Source: Bongaarts and Potter, 1983, Figure 4.1, p. 79.

CORRELATES OF CONTRACEPTIVE METHOD CHOICE IN INDONESIA

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Introduction

In this paper both the 1987 National Indonesian Contraceptive Prevalence Survey (NICPS)[1] and the monthly service statistics from Indonesia's National Family Planning Coordinating Board (BKKBN) are analyzed to identify correlates and possible determinants of contraceptive method choice. One important objective is to assess the impact of program inputs, apart from the impact of personal and community characteristics, on contraceptive method choice. In this way, program managers can empirically measure the effectiveness of various program inputs on contraceptive choice policies and strategies. This is particularly relevant for BKKBN program managers who develop targets to accomplish government-mandated demographic and social goals.

This study also distinguishes types of individuals or communities which use specific contraceptive methods. This information is valuable for program managers charged with increasing program effectiveness, because it can be used to detect factors influencing contraceptive use and method choice rates independent of program inputs. Knowledge that factors external to the program affect contraceptive use and choice can help spur horizontal administrative linkages and integrated planning with other government and non-government agencies. This is particularly important for the Indonesian National Family Planning Program because, even within its own domain, BKKBN coordinates, rather than directly controls, many of the resources allocated for family planning.

The next section will sketch BKKBN's method priorities, followed by a description of contraceptive use and method mix. Subsequent sections will describe data sources, methodology, findings, and conclusions.

BKKBN'S Current Method Priorities

BKKBN decision makers have consistently encouraged use of the IUD, correctly assessing it as the most cost effective method of those available. Despite this promotion, method-specific contraceptive prevalence rates from the monthly service statistics show that IUD use has been relatively flat over the past decade, usually fluctuating between one-fifth and one-fourth of all current users (Figure 1). Weak demand rather than supply evidently explains this lack of public acceptance, possible reasons for it being religious objections, medical complaints, limited accessibility to clinics in isolated areas, and insufficient information, education, and communication (IEC) and counselling. One supply factor, limited accessibility to sources of supply in isolated rural areas, may also be important.

During the first half of the current decade, use of injectables has risen dramatically in Indonesia, going from virtually no use in 1980 to approximately 20 percent in 1985 (Figure 2). Use since then has plateaued, mainly because of supply shortages. BKKBN views injectables as considerably less cost-effective than IUDs, but offers them in response to strong public demand. Pill use has generally declined in tandem with this rise in injectable use, which suggests that switching has occurred from one to the other. Monthly service statistics now show pill use to constitute roughly half of total use.

National Family Planning Coordinating Board monthly statistics over the past decade show that sterilization, mainly tubectomy, constitutes roughly 5 percent of all contraceptive use. This figure has also been relatively static. Sterilization has not yet been officially incorporated into the national program because of religious sensitivities to the irreversibility of the method. BKKBN, however, unofficially endorses efforts by NGOs to offer sterilization services.

In short, BKKBN policy makers encourage use of IUDs and sterilization on the grounds of both method and cost effectiveness, but are hampered in their endeavors by problems such as lack of demand and institutional constraints. Injectables, and more recently implants, are the most popular methods, but suffer programmatically by not being cost effective.

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[1] The Institute of Resource Development (IRD), in collaboration with Indonesia's Central Bureau of Statistics and the National Family Planning Coordinating Board, conducted the National Indonesian Contraceptive Prevalence Survey in late 1987. It represents one component of the USAID-funded Demographic and Health Surveys.

The 1987 NICPS Contraceptive Use and Method Mix Rates

The recently released Country Report of the National Contraceptive Prevalence Survey describes the state of Indonesian contraceptive use and method mix as of the end of 1987. It shows that 47.7 percent of married women of reproductive age currently use a contraceptive method and 44 percent use a modern method (defined as pills, IUDs, injections, condoms, male and female sterilization, and implant). Disaggregated by method choice, 33.7 percent of current contraceptive users use pills, 27.7 percent IUDs, 19.7 percent injectables, 3.4 percent condoms, 6.5 percent female sterilization, 0.5 percent male sterilization, 0.8 percent implant, 7.7 percent other methods (periodic abstinence, withdrawal, and traditional methods) (NICPS, 1987: p. 34).

Data Sources and Variables

The study uses three types of explanatory variables drawn from two sources in order to model the method-specific probabilities of contraceptive use. The three types of explanatory variables are (1) respondent and household, (2) community, and (3) program variables. Respondent and household variables are taken directly from the NICPS, and community variables are calculated from these respondent or household variables by aggregating them at the census block level; program input variables are taken from kecamatan (subdistrict)-level BKKBN monthly service statistics.[2]

Use of the NICPS and the monthly service statistics allows identification of several groups of variables typically associated with contraceptive use and method decisions. These groups include socioeconomic, demographic, contraceptive knowledge and attitude, and programmatic variables. The BKKBN monthly reporting system provides no fewer than 56 separate measures of program inputs and activities which may have direct or indirect effects on contraceptive use. In addition, the NICPS collected an impressive amount of information on the background characteristics of respondents and their households; this information can either be measured at the individual level or aggregated at the census block level to yield community level characteristics. There are 50 separate background characteristic variables, including both individual and aggregated values, which could, potentially, have entered the analysis on contraceptive choice. The sheer volume of the data available for inclusion in this study and attendant problems of their interpretability, however, led to reducing their number.

Choice of variables for inclusion in the model was based on theoretical considerations of exogeneity and endogeneity. Exogeneity implies that the values of the explanatory variables are not influenced by the value of the dependent variable or by unobserved factors influencing the dependent variable. To the degree possible, explanatory variables were specified as exogenous. The respondent level variables -- age, education, husband's education, and religion -- are widely used in the literature as exogenous variables. Other variables potentially influenced by contraceptive use and choice decisions, such as occupation and commodity ownership, were aggregated at the community level, the assumption being that community social and economic environments logically influence individual contraceptive choice rather than vice-versa. Community level variables can thus be more confidently viewed as exogenous than those at the individual level.

The same assumption holds true for the program variables -- subdistrict level family planning inputs or activities by eligible couples -- although in this case the interpretation of the variables is more complicated. Recent literature suggests that community level measures of government program inputs (location of clinics, IEC meeting frequencies, family planning field worker visits, etc.) must be treated as endogenous, since they are generally the result of some optimal strategy by program administrators (Rosenzweig and Wolpin, 1986). For example, a negative correlation between contraceptive use and clinic access could occur because clinics are placed where they are needed most. This problem has been highlighted by observations that program inputs, such as access to family planning clinics, are frequently negatively correlated with measures of contraceptive use (Rosenzweig and Wolpin, 1986; Casterline, 1986; Lerman, et al., 1989). Since it seems implausible that improved

[2] A Kecamatan or subdistrict is an Indonesian administrative unit, the smallest unit used by BKKBN for compilation of many of its service statistics. There are 3,787 Kecamatan in Indonesia, each on average containing 8,000 households. This compares with an average of 100 households per NICPS sample census block from which approximately 30 households were interviewed. This information was used to develop the community variables.

access to program inputs would induce women not to use contraception, the endogenous character of program inputs appears valid.

In spite of the unavoidable endogeneity of some of these measures, a strong case can still be made for their inclusion in the model. These variables serve to give a useful snapshot of the state of program inputs, and the direction and magnitude of their coefficients can lead to plausible interpretations of their effects on contraceptive use and choice. Note that although results from such an analysis cannot be used to infer optimal levels of investments, they do serve the valuable function of identifying the types of regions, communities, or individuals which gravitate toward use of certain types of contraceptives.

Table 1 presents the means and standard deviations of the explanatory variables in this study disaggregated by method use.

Methodology

The statistical specification for this analysis is a polytomous (or multinomial) logit function. (See Schmidt and Strauss, 1975 for a detailed description.) This specification permits estimates of the relationships between explanatory variables and the logarithm of the relative probabilities of mutually exclusive outcomes. More precisely, it fits maximum likelihood parameters to the following logged relative probability equation:

$$\mathrm{Ln}(P_i/P_j) = X'B_{ij},$$

when Ln(.) is the natural logarithm operator, P_i and P_j are the probabilities of women choosing methods i and j, respectively. X represents an array of the full set of explanatory variables, and B_{ij} represents the vector of coefficients.

Findings

The results of the logistic regressions are presented in Tables 2 and 3. Table 2 shows the relative probabilities of currently married, non-pregnant women in the reproductive age groups using three kinds of program methods -- pills, injectables, or IUDs -- versus not using or using a traditional method. Another 4-5 percent using sterilization or implants were omitted from the analysis. Table 3 shows the probability of women using one of these program methods rather than any of the others.

Individual Level Variables

The age variable is included in linear and squared forms to allow for non-linear relative probabilities of use with age. Both the linear and quadratic terms were highly significant in all three method vs. no modern method specifications. The coefficients show that the probabilities of method use increase and then decrease with age. The point at which these relative probabilities reach their maximum depends on the relevant method. For pills, the age of maximum use rates is 30, for injectables 27, and for IUDs 33. Women of youngest age may be less prone to use contraception or the more effective methods because of their desire to become pregnant. Women of oldest age may be less likely to use program contraceptives because of subfecundity, declining frequency of intercourse, loss of spouse, or choice of sterilization. No differences in this curvilinear relationship appear in the comparison between the three program methods (Table 3).

The relative probabilities of using each of the three major program methods versus not using a modern method is also modelled as a quadratic function of education. As with the age term, these relative probabilities have a positive linear and negative squared effect. Although these relative probabilities would attain their peak at relatively young ages, the years of education associated with the highest relative probabilities are, in some cases, beyond the typical range of women's schooling. The schooling of peak pill use is calculated at 6.4 years and that of injection usage at 7.8 years. Since the proportion of women with greater than an elementary school education is under 25 percent in Indonesia, this suggests there is probably little if any significant decline in method use probabilities. In the extreme case, the schooling associated with peak calculated IUD use is 14.2 years. Since virtually no women in the survey report this many years of schooling, these results merely imply that

the probabilities are generally increasing, and that their rate of increase tends to level off at higher levels of education.

Women who are least educated may shy away from using contraception because of a lack of knowledge or misinformation about methods and their side effects, uneasy feelings about dealing with family planning, health, and other government officials, and residence in isolated areas.

Husband's education has only a marginal impact on method use and choice. Husbands of women who use injections are more highly educated than husbands of women who use no modern contraceptives or pills. Husbands of women who use IUDs are also more highly educated than husbands of women who use pills. These relationships suggest that, all else being equal, husbands may have a real, though relatively minor, impact on their wives' choice of the more effective kinds of contraceptives.

Religion, as expected, plays a major role in method use and choice in Indonesia. Islam is strongly correlated with the probability of choosing injectables compared with no modern methods, but also no modern methods compared with IUDs. It is also strongly correlated with using pills or injectables rather than IUDs. Many Moslems object to the intimate physical contact between IUD providers and their clients, and for that reason, prefer hormonal methods. This concern still appears to exist, despite recent rulings from high Moslem councils conditionally endorsing IUD use.

Program Variables

The number of doctors and midwives per thousand eligible couples is not associated with the probability of modern contraceptive use versus non-use nor does it differentiate use between the various methods. Since one would assume that higher numbers of doctors and midwives would be correlated with use of the clinic-based methods, this is an unexpected finding. There are two plausible explanations for this result. First, this variable represents doctors and midwives working in clinics, and there is only one clinic or, at most, two per subdistrict. For this reason, there may not be much variability in this measure, a conclusion confirmed by the means and standard deviations in Table 1. Second, the negative coefficients in Table 2 suggest that doctors and midwives may be assigned to areas with low pill and IUD rates, a possible program response to boost these methods.

The number of IEC workers per thousand eligible couples is negatively correlated with the probability of pill use relative to no modern method use. It is positively associated with IUD vs. no modern method use and also IUD vs. pill use. These findings suggest that IEC workers have their strongest impact in promoting IUDs, possibly at the expense of pills.

The number of acceptor groups per thousand eligible couples is positively and significantly correlated with hormonal method use as compared with no modern method use. They are also strongly associated with pill, rather than injectable and IUD use, as well as injectable, rather than IUD, use. Acceptor groups tend to be more heavily concentrated in Java-Bali than in the Outer Islands, but in its less-developed areas. Contraceptive prevalence rates also tend to be higher in Java-Bali than in the Outer Islands, but subdistricts in which acceptor groups are located evidently have relatively high pill and injectable rates. In this case, as with the doctors/midwives variable, patterns of contraceptive use have evidently helped determine program input levels.

Village and hamlet contraceptive distribution centers per thousand eligible couples have little influence on either contraceptive use or method choice. This finding is surprising in light of the responsibility these centers have in distributing pills. The mean scores of this variable suggest little variation by contraceptive type, which could occur if the establishment of village and hamlet contraceptive distribution centers was based on administrative criteria. Another explanation for this lack of discernible impact involves the way in which the variable was constructed, summing village and hamlet centers together. There is evidence to suggest that the hamlet centers are more common in areas with high IUD rates, again a program response to an existing contraceptive use and method-mix situation (Lerman, et al., 1989). It is thus possible that village and hamlet centers act in countervailing ways.

The frequency of mobile medical team visits is highly correlated with IUD vs. no modern method use and also IUD vs. pill use. It is also associated with higher injectable vs. pill use rates. Doctors, midwives, field workers, and social leaders typically participate in these mobile medical teams; their primary tasks include both the distribution of contraceptive methods and IEC. These findings offer clear evidence that mobile medical teams have a positive impact on promoting preferred program methods.

The supervisor administrative activities index is negatively correlated with injectable use, relative to both no modern method and IUD use. Because of the relatively high cost per couple year of protection of pills and injectables and also because of their relatively high discontinuation rates, the program currently encourages a transition from these hormonal methods to IUDs (although it does not actively discourage hormonal method use). Of these two less-favored methods, however, BKKBN may lean more toward pills since there are no supply shortages of them. These program strategies have apparently not been lost on program supervisors.

These same relationships, however, do not pertain to field worker administrative meetings. In this case, a negative correlation between IUD use and no modern method use approaches significance; the same holds true with pills and injectables compared with IUDs. There may be two explanations for these findings. The first is that more administrative meetings among field workers may be held in areas which do not meet the program method mix objective of high IUD rates. The second is that a higher number of field worker administrative meetings may be held to increase contraceptive prevalence rates, a goal most easily attained by raising hormonal method rates.

Community Variables

A strong positive correlation exists between the percent of women in communities who have ever worked regularly to earn money and both injectable and IUD use vis-a-vis no modern method use; the same relationship exists with injectable and IUD use compared with pill use and IUD use compared with injectable use. In all cases, use of the most effective methods tends to be high in communities with relatively high percentages of women who have worked regularly to earn money. This finding strongly supports the widely observed phenomenon that female employment opportunities are an effective spur to contraceptive use. It is also interesting that this particular incentive works best to promote the IUD, the preferred program method.

Communities having a large percent of households with dirt or earth floors are negatively correlated with IUD vs. no modern method use. They are also negatively correlated with IUD use relative to pill and injectable use. This variable is meant to serve as an indicator of household poverty in communities, and, as such, indicates relatively high no modern method or hormonal method use in these areas.

Communities with higher percentages of women who have heard or seen a message about family planning on radio or television in the past month are more likely to use IUDs than no modern methods or hormonals. This finding implies higher levels of awareness in communities with high IUD use. It may indicate that informational campaigns about effective contraceptives lead to higher IUD use, an interpretation supported by the IEC worker variable, or it may indicate that IUD users have greater complaints which induces them to be more sensitive to family planning messages.

Communities with higher average client visits by family planning workers in the past six months have significantly higher pill and injectable use compared with no modern method use. No differences appear between the three program methods. Field workers have different priorities of tasks depending on area. In some villages, their primary responsibility may be to supply pills, in others, to motivate clients and community leaders to accept preferred program methods. For this reason, a strong correlation between field worker visits and specific methods may not appear.

Communities with higher percentages of women who read newspapers, watch television, or listen to the radio have marginally higher use of all three program methods compared with no modern use. This relationship is strongest for IUD use. No differences between methods, however, appear on this measure.

Communities with higher percentages of husbands in professional, technical, and clerical occupations tend to have significantly higher IUD use than no modern or hormonal use. As a measure of community

economic development, this variable behaves according to expectation and is consistent with the inverse relationship of the dirt floor variable.

Communities with higher percentages of households owning radios/cassettes tend to have significantly higher IUD use than no modern use, pill, or injectable use. It is surprising to note, however, that pill use vs. non modern method use is significantly less likely in communities with relatively high percentages of household owning radios/cassettes. This finding is not clear and bears further investigation.

Urban communities tend to have significantly lower IUD use than no modern method use or hormonal use. This finding is contrary to expectation, but may result from provincial differentials in contraceptive method use. There are disproportionate concentrations of IUD users in Bali and Yogyakarta compared with other provinces. As expected, Java-Bali has significantly higher injectable and IUD use than no modern method, pill, and injectable use and also higher injectable than pill use (check). The National Family Planning Program started five to ten years earlier in Java-Bali than in the Outer Islands and thus had a longer time to promote the most effective methods.

Conclusions

As stated at the outset, one of the prime purposes of this study is to provide empirical evidence to program managers about the effects of program inputs on contraceptive use and method choice rates. Because the survey and service statistics data used in the analysis are cross-sectional and because the program input variables are endogenous in character, interpreting the results requires knowledge about BKKBN's planning and operating strategies. In some instances, inputs probably exercised a strong effect on subsequent use and method-mix patterns; in other instances, inputs were probably allocated on the basis of program design responsiveness to existing conditions. Whatever interpretations are attached to the findings, however, the analytic technique employed in this study does not allow researchers to distinguish between correlations caused by program inputs and those caused by program design with any assurity. It thus becomes difficult to have confidence that this kind of study can serve to rectify erroneous ideas about program operations.

Studies using cross-sectional data can be valuable to the degree that they provide current snapshots of correlations between variables. Because time series information is often not gathered, use of cross-sectional data may be the only means available to researchers to illustrate relationships between program inputs and contraceptive use.

Several findings emerge which illuminate underlying relationships between program inputs and contraceptive use and method mix patterns. First, the lack of a positive relationship between doctors/midwives per thousand eligible couple and contraceptive use suggests that this resource is allocated on the basis of equity. Placing one clinic or, at most, two, per subdistrict reflects an administrative decision to offer health and family planning services reasonably accessible to all people. The negative coefficients, which show higher doctors/midwives ratios to population in low pill and IUD areas, may indicate the current program priority to boost contraceptive prevalence rates in low-performance areas. Placing higher numbers of doctors/midwives in areas with a high potential demand for IUDs, however, would appear to be a more cost effective strategy.

Three levels of variables -- individual, community and program -- have significant relationships with contraceptive use patterns. This is of particular methodological relevance, since the program methods were measured from an entirely separate data gathering source, and the community variables were computed using the numbers of households interviewed per sample block. Both of these sets of variables contributed significantly to the picture of the program provided here.

Individual and community variables have highly significant (and easily interpreted) relationships with contraceptive choice. Most notable among these are the clear picture of IUD use as characterized by more developed and organized communities and pill use by poorer, less well organized communities.

Among the program variables, IEC workers and mobile medical team visits stood out as indicating significant program impacts on contraceptive use, most notably on IUD use. Curiously, the one clinic variable

which we included was negatively related to IUD and pill use. Again, this convenient methodology permits us to attribute this to vagaries of the program design.

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Table 1 Means and Standard Deviations (in parentheses) of the Explanatory Variables by Use of Pill, Injectable, and IUD, and No Modern Method Use, Indonesia, 1987

	No Modern Method Use	Pill Use	Injectable Use	IUD Use
Individual-level Variables[1]				
Age	33.31 (9.38)	30.19 (7.00)	28.66 (6.59)	32.45 (7.52)
Age squared	1198.00 (635.60)	960.20 (445.60)	864.80 (409.60)	1110.00 (507.10)
Education	4.23 (3.78)	4.26 (3.30)	5.48 (3.53)	5.24 (4.08)
Education squared	32.23 (46.47)	30.79 (38.97)	42.47 (46.15)	44.08 (54.70)
Husband's education	5.75 (4.12)	5.75 (3.59)	6.93 (3.69)	6.73 (4.26)
Islam	0.88 (0.32)	0.91 (0.27)	0.90 (0.29)	0.68 (0.47)
Program Variables[2] (per 1000 eligible couples)				
Doctors/midwives	1.26 (1.84)	1.05 (1.24)	1.30 (1.45)	1.13 (1.17)
IEC Workers	1.27 (1.59)	1.36 (1.78)	1.22 (1.86)	1.47 (1.56)
Acceptor Groups	13.99 (20.78)	18.40 (26.71)	17.51 (26.84)	13.59 (14.45)
Contraceptive Distribution Centers	10.54 (9.78)	10.78 (8.91)	10.77 (9.97)	11.91 (9.37)
Mobile Medical Team Visits	67.66 (68.24)	65.81 (54.14)	70.28 (58.48)	88.50 (59.17)
Supervisor Activities Index[3]	17.24 (13.52)	17.72 (14.43)	16.10 (11.82)	18.03 (12.75)
Field Worker Activities Index[4]	30.89 (24.20)	32.99 (25.60)	32.69 (24.85)	35.33 (23.88)

	No Modern Method Use	Pill Use	Injectable Use	IUD Use
Community-level Variables[5]				
Ever Worked Regularly to Earn Money	0.63 (0.22)	0.63 (0.22)	0.64 (0.21)	0.75 (0.20)
Dirt or Earth Floor	0.74 (0.32)	0.71 (0.32)	0.76 (0.30)	0.64 (0.35)
FP Message on Radio or TV in Past Month	0.28 (0.18)	0.29 (0.17)	0.31 (0.118)	.31 (0.18)
Visit by FP Worker in Past Six Months	0.17 (0.17)	0.19 (0.18)	0.19 (0.18)	0.21 (0.19)
Modern Communications Index[6]	1.50 (0.67)	1.47 (0.64)	1.65 (0.63)	1.56 (0.62)
Husband's Professional, Technical, or Clerical Occupation	0.14 (0.16)	0.12 (0.13)	0.15 (0.16)	0.16 (0.17)
Household Ownership of Radio/Cassette	0.63 (0.22)	0.59 (0.21)	0.67 (0.20)	0.68 (0.19)
Urban[7]	0.33 (0.47)	0.27 (0.44)	0.40 (0.49)	0.29 (0.45)
Java-Bali[8]	0.67 (0.47)	0.69 (0.46)	0.79 (0.41)	0.88 (0.34)
Constant	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)

1 Data Source: National Indonesian Contraceptive Prevalence Survey, 1987
2 Data Source: National Family Planning Coordinating Board Monthly Service Statistics, 1987
3 The Supervisor Administrative Index was created by summing supervisor internatl, external, and coordinating meetings.
4 The Field Worker Administrative Index was created by summing field worker external and coordinating meetings.
5 Data Source: National Indonesian Contraceptive Prevalence Survey, 1987
6 The Modern Communications Index was created by summing the percentage of respondents in census blocks who usually read a newspaper or a magazine at least once a week, who usually watched television at least once a week, and who usually listened to the radio every day.
7 Reference Category: Rural.
8 Reference Category: Outer Islands.

Table 2 Multinomial Logit Coefficients and T-Ratios (in Parentheses) for Pill, Injectable, and IUD Method Use, Indonesia.

	Pill vs. No Modern Method Use	Injectable vs. No Modern Method Use	IUD vs. No Modern Method Use
Individual-level Variables			
Age	0.42 (12.47)	0.36 8.98)	0.40 (12.43)
Age squared	-0.01 (-13.49)	-0.01 (-10.23)	-0.01 (-12.78)
Education	0.14 (5.24)	0.16 (5.25)	0.09 (3.88)
Education squared	-0.01 (-5.06)	-0.01 (-4.52)	-0.00 (-1.94)
Husband's Education	-0.01 (-0.59)	0.02 (1.97)	0.02 (1.71)
Islam	0.20 (1.61)	0.42 (3.07)	-0.91 (-10.05)
Program Variables (per 1000 eligible couples)			
Doctors/Midwives	-55.86 (-1.90)	-17.66 (-0.60)	-52.97 (-1.95)
IEC Workers	-55.70 (-2.02)	-8.25 (-0.25)	48.26 (1.77)
Acceptor Groups	8.93 (5.58)	3.99 (2.00)	-1.42 (-0.76)
Contraceptive Distribution Centers	0.46 (0.10)	2.73 (0.52)	0.47 (0.11)
Mobile Medical Team Visits	-1.20 (-1.66)	0.96 (1.27)	2.17 (3.35)
Supervisor Activities Index	0.84 (0.25)	-11.92 (-2.64)	3.68 (1.08)
Field Worker Activities Index	1.83 (1.08)	1.46 (0.70)	-3.13 (-1.86)

Table 2 Continued.

	Pill vs. No Modern Method Use	Injectable vs. No Modern Method Use	IUD vs. No Modern Method Use
Community-level Variables			
Ever Worked Regularly To Earn Money	0.27 (1.57)	0.83 (3.95)	1.77 (9.00)
Dirt or Earth Floor	-0.24 (-1.75)	0.23 (1.30)	-1.60 (-11.19)
FP Message on Radio or TV in Past Month	0.62 92.04)	0.06 (0.18)	1.48 (5.22)
Visit by FP Worker in Past Six Months	0.44 (2.07)	0.62 (2.49)	0.16 (0.83)
Modern Communications Index	0.20 (1.81)	0.21 (1.67)	0.25 (2.29)
Husband's Professional, Technical, or Clerical Occupation	-0.12 (-0.38)	-0.25 (-0.71)	0.91 (3.21)
Household Ownership of Radio/Cassette	-1.21 (-5.13)	-0.21 (-0.73)	0.75 (3.03)
Urban (Ref: Rural)	-0.11 (-1.09)	-0.02 (-0.15)	-0.43 (-4.42)
Java-Bali (Ref: Outer Islands)	-0.05 (-0.53)	0.42 (3.73)	0.82 (7.72)
Constant	-7.02 (-12.39)	-8.31 (-12.40)	-9.05 (-15.93)

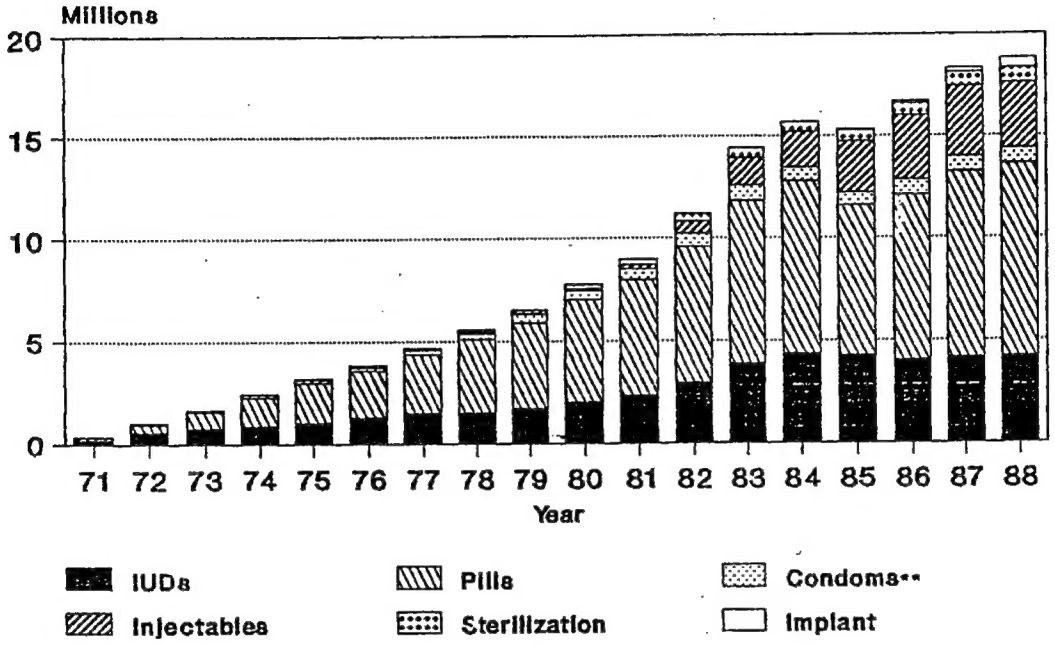
Table 3 Multinomial Logit Coefficients and T-Ratios (in parentheses) for Pill, Injectable, and IUD Method Choice, Indonesia, 1987.

	Injectable Use vs. Pill Use	IUD Use vs. Pill Use	IUD Use vs. Injectable Use
Individual-level Variables			
Age	-0.53	-0.02	0.04
	(-1.10)	(-0.38)	(0.78)
Age Squared	0.00	0.00	0.00
	(0.48)	(1.35)	(0.67)
Education	0.03	-0.04	-0.07
	(0.77)	(-1.40)	(-2.02)
Education Squared	0.00	0.01	0.01
	(0.11)	(3.03)	(2.75)
Husband's Education	0.03	0.03	-0.01
	(2.13)	(1.86)	(-0.46)
Islam	0.22	-1.11	-1.34
	(1.37)	(-8.46)	(-9.19)
Program Variables (per 1000 Eligible Couples)			
Doctors/Midwives	38.20	2.89	-35.31
	(1.02)	(0.08)	(-0.98)
IEC Workers	47.46	104.00	56.50
	(1.25)	(3.10)	(1.49)
Acceptor Groups	-4.94	-10.34	-5.41
	(-2.28)	(-4.97)	(-2.28)
Contraceptive Distribution Centers	2.27	0.01	-2.26
	(0.36)	(0.00)	(-0.38)
Mobile Medical Team Visits	2.15	3.36	1.21
	(2.32)	(3.96)	(1.38)
Supervisor Activities Index	-12.76	2.84	15.60
	(-2.53)	(0.68)	(3.08)
Field Worker Activities Index	-0.37	-4.96	-4.59
	(-0.16)	(-2.41)	(-1.95)

Table 3 Continued.

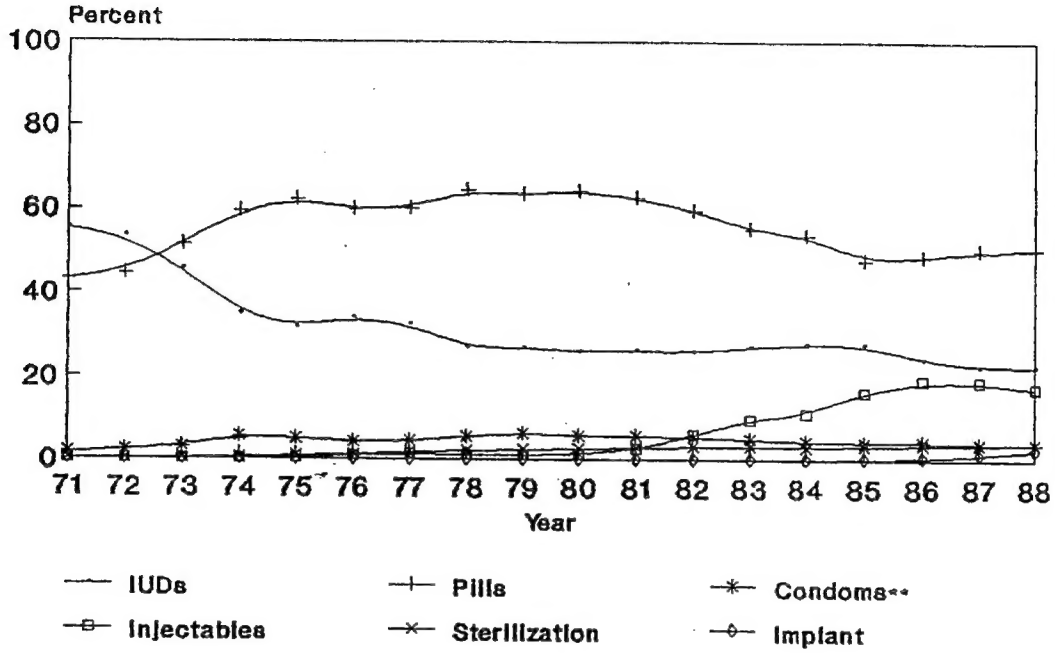
Community-level Variables	Injectable Use vs. Pill Use	IUD Use vs. Pill Use	IUD Use vs. Injectable Use
Ever Worked Regularly to Earn Money	0.57 (2.35)	1.50 (6.49)	0.94 (3.61)
Dirt or Earth Floor	0.47 (2.37)	-1.36 (-7.88)	-1.83 (-9.10)
FP Message on Radio or TV in Past Month	-0.56 (-1.40)	0.86 (2.37)	1.42 (3.65)
Visit by FP Worker in Past Six Months	0.18 (0.63)	-0.28 (-1.10)	-0.45 (-1.63)
Modern Communications Index	0.02 (0.13)	0.06 (0.42)	0.04 (0.25)
Husband's Professional, Technical, or Clerical Occupation	-0.13 (-0.31)	1.04 (2.78)	1.17 (2.96)
Household Ownership of Radio/Cassette	1.00 (3.03)	1.96 (6.64)	0.96 (2.85)
Urban (Ref: Rural)	0.09 (0.70)	-0.31 (-2.66)	-0.41 (-3.23)
Java-Bali (Ref: Outer Islands)	0.47 (3.63)	0.87 (6.97)	0.40 (2.86)
Constant	-1.28 (-1.61)	-2.03 (-2.80)	-0.74 (-0.92)

Figure 1: Contraceptive Use by Method in Indonesia, 1971-1988*



Source: BKKBN Monthly Service Statistics
* Dates Refer to Planning Years
** Includes Vaginal Tablets

Figure 2: Percent Contraceptive Use by Method in Indonesia, 1971-1988*



Source: BKKBN Monthly Service Statistics
* Dates Refer to Planning Years
** Includes Vaginal Tablets

Demographic and Health Surveys Further Analysis Series

1. "Health and Population Studies Based on the 1987 Thailand Demographic and Health Survey"
   Institute of Population Studies, Chulalongkorn University
   December 1989